DOCUMENT RESUME

ED 247 125 SE 044 721

| | |
|---|---|
| AUTHOR | Atchia, Michael, Ed. |
| TITLE | Research in Community-Based Biological Education. 4 Case-Studies. |
| INSTITUTION | International Union of Biological Sciences. Commission for Biological Education. |
| PUB DATE | Jun 82 |
| NOTE | 129p. |
| AVAILABLE FROM | Copies may be obtained from: Dr. Michael Atchia, Mauritius Inst. of Education, Reduit, Mauritius; or Prof. P. J. Kelly, Faculty of Educational Studies, The University, Southampton, SO9 5NH, United Kingdom. |
| PUB TYPE | Reports - Research/Technical (143) |
| EDRS PRICE | MF01/PC06 Plus Postage. |
| DESCRIPTORS | Aging (Individuals); *Biology; Case Studies; *Community Development; *Developing Nations; *Environmental Education; *Health; Models; Physical Environment; Public Opinion; Science Curriculum; *Science Education |
| IDENTIFIERS | Environmental Education Research; *Science Education Research |

ABSTRACT

Several case studies of research into the biological needs of communities in developing countries were conducted and two strategies for relating biological education (in both formal and nonformal contexts) to community development were identified. Four of these case studies are presented. They are: (1) "From Biological Knowledge to Community Development" (Abraham Blum), in which a tentative model describing six factors of applying biological knowledge to community development is presented and illustrated in the case study; (2) "Concepts and Perceptions about the Environment of People in an Upland Community" (Dolores Hernandez); (3) "Concept of Health and Aging among Children of a Fishing Community" (Dolores Hernandez); and (4) "Assessment of Community Needs in Mauritius - The Gap between Commonly Believed and Actually Expressed Needs" (Michael Atchia). Each study includes background information, rationale, methodology, results, conclusions, and educational implications. The two strategies for community-based biological education are outlined in the introduction. There is an output model (in which biological knowledge possessed by a small human community is studied, with reference to how this knowledge is used in solving the community's needs) and an input model, which implies an input of biological knowledge into a community to achieve development under one or several aspects. (JN)

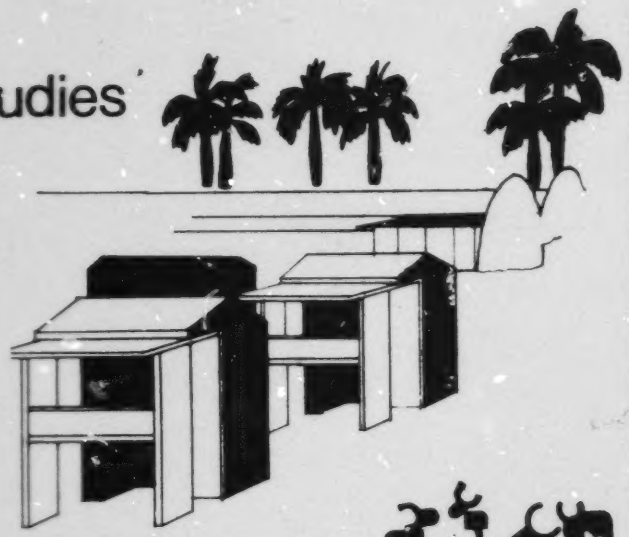
**********
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
**********

ED247125

U.S. DEPARTMENT OF EDUCATION
NATIONAL INSTITUTE OF EDUCATION
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)
✓ This document has been reproduced as received from the person or organization originating it.
Minor changes have been made to improve reproduction quality.
• Points of view or opinions stated in this document do not necessarily represent official NIE position or policy.

# RESEARCH in Community-based BIOLOGICAL EDUCATION

## 4 case-studies

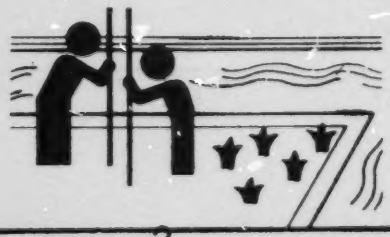


"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY
Michael Atchia
TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

Edited by
Michael Atchia

SE 044721

IUBS



# RESEARCH IN

# COMMUNITY - BASED

# BIOLOGICAL EDUCATION

Edited by

Michaël Atchia

On behalf of the

Commission for Biological Education of the
International Union of Biological Sciences (IUBS)

© IUBS Commission Biological Education and
Contributors, 1982.

Copies may be obtained from

Dr Michaël ATCHIA(Editor)
Mauritius Institute of Education
Réduit
MAURITIUS

or

Prof. P. J. KELLY (Chairman IUBS-CBE)
Faculty of Educational Studies
The University
Southampton, SO9 5NH
U.K

Printed in Mauritius at the Mauritius Institute of Education Production Unit, Réduit.

## CONTENT


| | | Page |
|---|---|---|
| Preface | Editor | 1 - 3 |
| Strategies for Community-based biological education | M Atchia<br>D. Hernandez<br>G.M. Gutierrez-Vasquez | 4 - 8 |
| From Biological Knowledge to Community Development | A. Blum | 9 - 19 |
| Concepts and perceptions about the environment in an upland community | D. Hernandez | 20 - 57 |
| Concept of Health and Environment among children of a fishing community | D. Hernandez | 58 - 103 |
| Assessment of community needs in Mauritius - the gap between commonly believed and actually expressed needs | M. Atchia | 104 - 124 |

# PREFACE

A recent World Bank Report (1) stated that the level of general education of farmers had a positive effect on farmer productivity. This statement was based on some 17 case-studies carried out in different parts of the world. The average (unweighted) increase in farm output due to 4 years of primary education, rather than none, was 13.2% with complementary inputs (2) and 6.3% without complementary inputs (P.48 of the Report). The same report (page 50) cites studies carried out in Bangladesh, Kenya and Columbia which show that children are less likely to die, the more educated their mothers; studies from Sao Paulo (Brazil) showed that for any given income level, families were better fed the higher the mother's education.

To the above examples, one may add the case of the well-established relationship that exists between level of education (or the economic standing) and size of families; the higher the former, the smaller the latter.

If farm productivity, better health, better feeding and smaller families are aspects of community development which are closely affected by general primary education, how much more effective would specific biological education be?

For three years the Commission for Biological Education

---

(1) World Development Report 1980, The World Bank, Washington, August 1980.

(2) Complementary inputs include improved seeds, irrigation transport to markets etc.

of the International Union of Biological Sciences has concerned itself with this question. Its work has followed the theme of Biological Education for Community Development, in the hope of making some contribution to this vitally important field.

Following conferences held at London in 1979 and Kiel in 1980 devoted to this theme, the Commission published a book "Biological Education for Community Development" (3) which outlined ideas and surveyed activities in different parts of the world.

Subsequently, the Commission established a project to undertake case studies of research into the biological needs of communities in developing countries and to identify strategies for relating biological education, in both formal and non-formal contexts, to community development.

The members of the project were

Dr M. Atchia (Co-ordinator)
Prof. D. Hernandez
Prof. J.M. Guttierrez-Vasquez

Contributions were made to the study by Prof. V. Basnayake, Dr Magnus Cole, Dr Suresh Jain, Prof. Abraham Blum and Prof C. Quiroz.

This book contains accounts of some of the case-studies which were undertaken. It is hoped that it will complement, in a practical way, the larger volume 'Biological Education for Community Development'.

---

(3) Biological Education for Community Development, Edited by P.J. Kelly and G. Schaefer, Taylor & Smith, London, 1980.

Whilst the case-studies will, no doubt, provide information and ideas of interest and value, the main purpose of this book is to stimulate others to undertake similar research in this field. If the reader would wish to follow this suggestion, he or she, is requested to contact a member of the project team.

The Editor wishes to acknowledge the help he has received from the Mauritius Institute of Education in providing some facilities for the production of this booklet, particularly Mrs Afeeza Ruhomatally and her team at the Production Unit and to Miss Geetanjali Sampath for typing the manuscript.

M. Atchia

June 1982

Mauritius

Strategies for Community-based biological education

In the Preface an attempt has been made at justifying the need for research in the above named field.

From the onset two possible strategies were identified (by Atchia, Hernandez and Gutierrez-Vasquez). These were put to the test in a total of 10 separate case-studies of which 4 have been sufficiently developed and described to enable their inclusion in the present volume. The others, while not described at length here nevertheless contributed in clearing the ground and, through interchange of correspondence, fertilise the other projects.

Here are in brief these two strategies:

(a) AN OUTPUT MODEL where-by the biological (and scientific) knowledge possessed by a small human community is studied, with particular reference to how this knowledge is utilised in solving the community's needs.

The OUTPUT from this community (NEEDS + BIOLOGICAL KNOWLEDGE UTILISED IN SOLVING THESE NEEDS) could be of value to other communities within the same region/country, as well as, through international diffusion, to other countries elsewhere in the world. The concepts and traditional technologies identified in communities (e.g conservation practices, life supporting activities, bio-social traditions) would also be useful when

integrated into the formal educational system, specially during a curriculum development exercise aimed at transforming an education system which is largely foreign-based.

(b) AN INPUT MODEL, which may be run in 7 stages as follows:

(i) Identification of a human community

(ii) Setting up of a Community Action-Team, identification of places, agencies and contact people.

(iii) Finding out the needs of the community and setting out the restricted objectives attainable by the Action Team in view of the improvement of the quality of life in the community.

(iv) Determination of the biological (and scientific) knowledge to be introduced (the Input).

(v) Design of action programme.

(vi) Implementation of action programme.

(vii) Evaluation and adjustments.

The OUTPUT Model is illustrated here by the two studies of Hernandez, herself a pioneer in this field of community development through education. Her studies set out to "milk" a community for whatever concepts and perceptions it holds. Besides the obvious education and developmental implications, for the community itself, of the knowledge so acquired, such knowledge from a living community must represent a considerable contribution to fields as diverse as human biology, anthropology and sociology.

The second model implies an INPUT of biological knowledge into a community with the avowed aim of achieving development under one or several aspects. The first three stages of this strategy is illustrated by the study of Atchia with particular emphasis on the reality of community needs seen from outside and inside. The study of Blum completes the picture with his case-study of the Arava valley in semi-arid Israël.

It is now seen that both these strategies-output from a community and input into a community-complement each other. Neither should a community be regarded as an island into itself with its concepts and perceptions taken per se nor should a community's concepts and perceptions be totally ignored in favour of expert input from outside.

The conclusion of the study could be summarised in this short statement,

> without prior education what possible developmental action can there be? Without education there would be no development!

---

From the papers at hand and from two years work on this project a number of parametric and intrinsic questions have come to light. And it is, we believe, the correct attitude in scientific research to end a project by asking further questions.

- *Is the scope of biological science curricula wide enough and flexible enough to meet the challenge of serving human needs under their multitudinous daily-life aspects?*

  (A. Blum, letter to P.J. Kelly, 1978. " I was astonished how often lecturers of plant and animal sciences, even at faculties of agriculture, did not connect their research with the development needs of their agricultural communities).

  (M. Atchia, in Biology & Community, Chelsea 1978" ..... in other words biological education must expand)

- *How does a community develop from what some of its individual members learn?* (E. Rugumayo. 1978 "The actual learning process of biological principles takes place only at the personal level....." ".... manifested as personal development").

the issue of formal v/s non-formal education.

- *What are the interactions between students who undergo personal development and the rest of the community to which they belong?* (Sutton. C. 1979 "Teaching for action beyond school"

the place of indigenous biology, medicine, technology.

- *Indigenous versus international? indigenous and...? indigenous or ....? How is external, internationally accepted knowledge and practices adapted for/by small rural communities?*

- *What should be the place of human and social biology in biological curricula? Should school biology, for example need a strong base of the study of animals, plants and micro-organism, or can it, for immediate community needs, be overwhelmingly human based and socially orientated?*

  biology is not alone in catering for community development. Schools or indeed education itself, are not the sole agents of community development.

  *What are the existing (desirable) inter-relationships between the various agents of community development?*

  *how far can strategies for "biological education within communities" developed through small isolated pilot projects have any relevance outside the experimental situation?*

A process called development has become the ideal goal of all nations on this planet (UNEP, 1979).

*Do small isolated communities share this notion? If so, in what way? Is it fair to differentiate that aim of biology education which is community ( i.e human ) development, from the comparable aim of physics, mathematics and engineering education which, it is assumed, serves industrial and technological development.*

M. Atchia
D. Hernandez
J.M. Gutierrez-Vasquez

# FROM BIOLOGICAL KNOWLEDGE TO COMMUNITY DEVELOPMENT

## A model and case study of the transformation process

(Abraham Blum)*

Obviously, not all biological knowledge serves community development. What, then, are the main factors which determine if an item of biological knowledge can be used for community development, and what are the filters which separate the useful from the irrelevant?

In this paper, I shall present a tentative model which describes six major factors which modify the process of applying biological knowledge to community development. I shall then illustrate the working of the model in a case study and repeat the truism that each case is different.

### The Model

Biological knowledge, as such, has no purpose. Like other scientific knowledge, it is created and accrues in the process of wanting to know more. Usually, biological knowledge is sought with no intention to solve practical problems, but sometimes the researcher points out possible future applications. A classical case was von Frisch's discovery of the bee dance patterns. At the end of his original paper von Frisch[1] stated:

> "To introduce the procedure into practice would be a gratifying task for bee experimental stations. Then, as often before, the fruits of

---

1 Frisch, K.V. 1946. Die "Sprache" der Bienen und ihre Nutzanwendung in der Landwirtschaft. Experientia II, 397-404.

* Abraham Blum, The Hebrew University of Jerusalem, Israël.

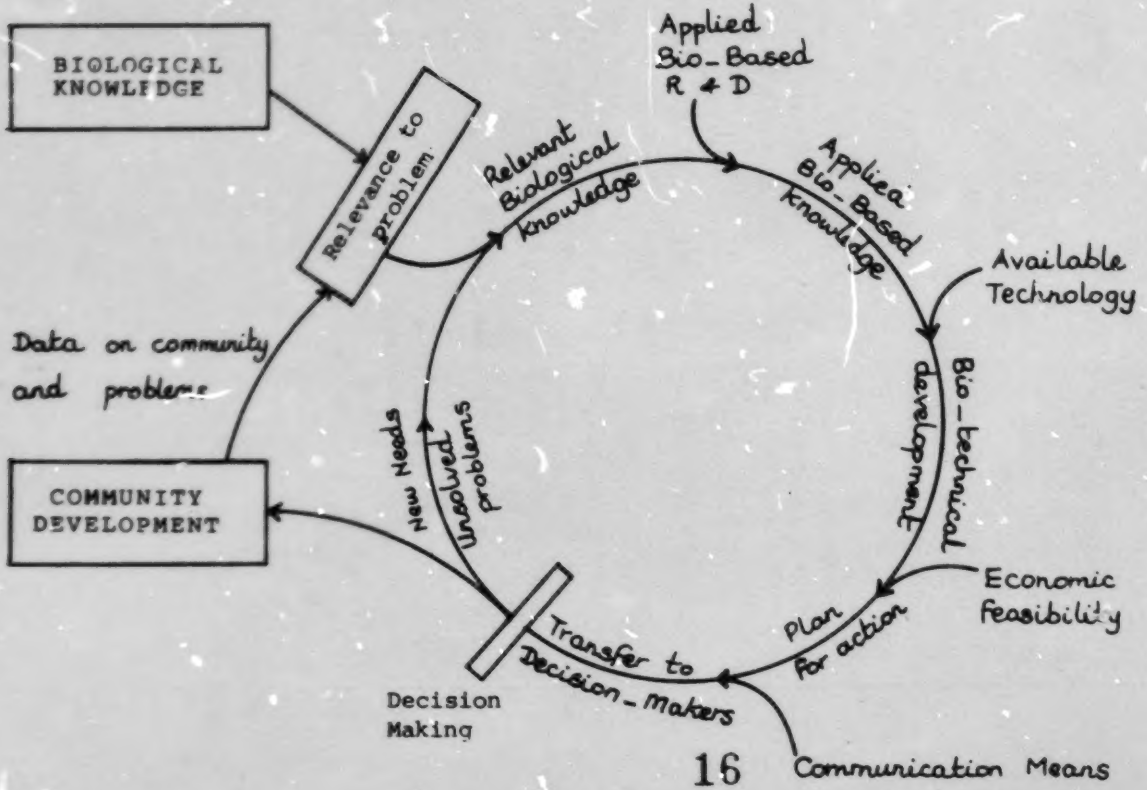
theoretical work will serve practice. As much as I hope and expect this to happen, allow me the confession: The purest joy remains that of insight, free of the earthly touch of a useful exploitation".

In other cases, basic biological research is done on a research grant which specifies that the knowledge sought should be relevant to a given bio-related problem. Thus, much of plant growth research was conducted in laboratories of agricultural stations, and much of bio-medical research is done in hospitals. Probably in most cases biological research is conducted without any practical implication in mind. Only when biological knowledge is re-viewed and re-searched for those elements which have a direct bearing on possible community development, specific and relevant elements are identified. In this first step, the vast amount of biological knowledge is sieved through a grid of data on the community to be served and on its development problems.

Actually, in most cases in which biological knowledge is applied to solve problems in a community, the action is triggered by researchers or intermediary change agents who identify the relevant biological knowledge which can be used to solve the problem. This happens in the stage which in the model is called Applied Bio-based Research and Development (R&D). This R&D work is done sometimes in a biological research institute, sometimes in an agricultural, nutritional, medical or other R&D institution, and sometimes even closer to the community to be served - in a regional extension or professional-educational centre. Only that knowledge which can be applied to solve the problem or can suggest an approach to solve it is considered. It is further refined and developed into recommendations how to solve the biological aspects of the community problem involved.

Fig. 1. THE BIOLOGICAL KNOWLEDGE FOR COMMUNITY DEVELOPMENT CYCLE

(BLUM)



Before these recommendations can be turned into plans for action, they must be tested for three constraints: available technology, economical feasibility and communication means. If the bio-based knowledge cannot be applied because of lacking technologies, or if it can be applied, but the technology is not economically feasible, or even if the solution is both technologically and economically acceptable, but does not reach the decision-makers in the community in a way understandable to them, no action towards community development can be expected. Such actions will only occur, if and when decisions in the right directions are taken and implemented at the community level.

The model should also remind us that we cannot hope for biological knowledge to affect community development by a simple diffusion process. If biologists want to reach the community and help to solve its problems, they have to co-operate with technologists, economists, communicators, educators and decision-makers.

Bio-technical development can be based on biological technology, e.g. in plant breeding, or it can be technical in the common sense of the word. In both cases the technology must be appropriate to the technical and economic capacity of the community to be served. This could be expected to be obvious, but it is often overlooked in practice. Many of the technological gadgets donated by rich nations to developing communities became white elephants, when no maintenance facilities were available and spare parts were unavailable or too expensive.

Unfortunately, a similar problem of appropriateness exists with biological developments. In the beginning the High Yielding Varieties of the Green Revolution seemed to be a panacea. It was assumed that since farmers everywhere knew how to sow, they would know how to do this

also with the new seeds. What the planners forgot to take in account was that these new varieties demanded more optimal conditions of growth than the local varieties. They were often planned for large farms using suitable machines which were not in the hands of the peasants. Thus lack of technological and economic capacity led in many places to a failure of the Green Revolution[2].

Another step which is often overlooked in the transformation process of biological knowledge for the use in community development is the identification and proper use of suitable communication means with which to reach those who have to work out, promote and decide upon the introduction of an innovation and then to monitor and evaluate its implementation. Here mainly the informal educational system with extension services in the lead, using mass and other media, come in. So far most of extension is based in giving prescriptions. A major educational effort is needed to educate community leaders how to cope with the new knowledge and how to decide for themselves what is best for them.

Whenever a new piece of knowledge, a new technique, a new approach is transformed from research reporting to use in community development, some of the problems remain for lack of an optimal solution, and new needs are identified. Therefore the search for relevant and applicable knowledge continues and a new cycle starts. As more data on the community and its problems and more knowledge become available and are carefully evaluated, the chances for better solutions to be found grow.

---

[2] See Dahlberg, K.A, 1979. Beyond the Green Revolution. The Ecology and Politics of Global Agricultural Development. New York and London: Plenum Press.

A Case Study

In order to show how the model works in practice, let us follow a case history. The community - farmers in the semi-arid, saline Arava valley in Southern Israel - is climatically and geographically typical for many agrarian communities living under semi-arid and close to arid conditions. Sociologically the Arava community is probably unique, because of the high educational standard of its members. This mixture of common and uncommon features can be found in every case study. Consequently, in case studies some aspects are generalizable, but others are so unique that no ready-made solution can be transferred from one case to another.

The Arava valley stretches from the Dead Sea to the Gulf of Aqaba. It is a desert with occasional winter rains averaging less than 50 millimeters a year. Temperatures reach more than 40 centigrade in August and fall to 17 degrees in January. Relative humidity is very low, and evaporation rates very high. The soils are typical desert formations with wind-blown coarse sand and heavier loess. They are highly saline and have to be leached before they can be cultivated. Occasional winter flash floods originating in the mountains to the West are too brief to allow surface storage, but they do replenish the blackish aquifers. When this water is pumped into furrows for gravity irrigation, less than half of the water reaches the plants, much is evaporated and therefore the water reaching the plants is extremely saline. Erosion is another problem. When sprinklers are used, the erosion problem is smaller, but evaporation rates are even higher, under the extremely dry conditions, and the saline water damages the foliage.

The Arava valley had two big advantages, when cultivation efforts started. Land was available, and because of the warm winter, a high potential for the winter crops existed if suitable varieties and a better suited irrigation method could be found.

A community description consists of natural-environmental and socio-economic parameters. While the arid conditions described are rather typical for many desert and close to desert regions, the human population which tried to master the environmental problems of the Arava valley for the first time, was rather unusual. The pioneering settlers were dedicated to their challenge, had themselves a fairly good education, were inclined towards experimenting, and had access to the research community. Therefore it was not difficult for them to define what relevant biological knowledge was needed. Either a halophytic crop had to be found and had to prove itself economically feasible, or a technology had to be developed, which would prevent the evaporation of most of the irrigation water.

Still in the 1950's an experimental desert garden was established near Elat, at the Southern end of the Arava valley, and dozens of cultural plants were tested in order to identify which varieties would be most resistant to salt damage. The most promising crop was Sisal, but its cultivation had no chance to become economical.

Then the second approach - to make better use of the water in irrigating winter crops - was considered. Now the problem become one of technology. For decades the principle of drip irrigation was known. Basically, it is very simple. Water is brought in pipes close to the plants and is then released through small holes in the pipe directly into area above the roots.

The first request for a patent for an irrigation unit resembling the dripper was filed in California already in 1874. It proved to be premature. About the same time, German farmers laid clay pipes with open joints into the soil in an effort to combine irrigation and drainage, as the water table in the soil rose

or fell during the year. It did not work. Another crude method was used in Australia, in the 1930's. Farmers cut holes with chisels into iron pipes to let water dropwise out. This method too did not give the expected results. In 1934, scientists at Michigan State University suggested to try a canvas hose, as used by fire brigades, but without the rubber lining, so that small droplets of water could perspire through the hose. At the same time, in England and Holland, growers tried to use in green houses rubber pipes into which small emitters were fitted.

The idea of the emitter was a big step forward, but emitters were too often clogged and the rubber became soon brittle, especially when exposed to the sun. Mice too seemed to like to add unplanned holes into the rubber pipes. To overcome the sun's effect on rubber, Israeli farmers tried to bury the rubber pipes underground, but the roots of the plants infiltrated the unsuitable emitters.

The next step in irrigation technology came after World War II, when the aluminium industry, which had boomed during the war and was looking for new outlets, started to produce cheap pipes which did not rust and could be transported easily. Sprinklers, mounted on aluminium pipes, revolutionized irrigated agriculture,but were not suitable for arid areas with saline water. The emitted drops had a very high evaporation rate, before they reached the soil or the plant. The real breakthrough came only with the uprise of a new technology: plastics.

Some 45 years ago, Simcha Blass, an Israeli water engineer, observed that a large tree near a leaking faucet exhibited a more vigorous growth than the other trees in the area. This led him to the concept of supplying water to plants drop by drop. He developed and patented a low pressure system for delivering small amounts of water to the roots of the plants at frequent intervals.

With the development of plastics technology this became possible. Lasers helped to bore very fine and exact holes into the plastic pipes.

The breakthrough would not have come about without the active co-operation of the Arava farmers who had a vital interest in the new development and other farming communities who had also water problems, but also experience with irrigation. One of the communal Kibbutz settlements in the area had a sprinkler factory and was interested and knowledgeable both in semi-arid agriculture and in irrigation technology. This close co-operation between technologists, manufacturers and clients accelerated the further development of the system, mainly through the introduction of a coiled emitter that prevented clogging and reduced discharge pressure. Using drip irrigation, a field trial in the Arava produced a harvest of 58.3 tons of tomatoes per hectare, compared to 35.8 with sprinkler irrigation. Drip irrigation proved to be also labour-saving and could be used to distribute water-soluble fertilizers directly to the rootsystem.

According to the"Biological Knowledge for Community Development"model described above, the next test was economic feasibility. In spite of the high costs of the drip irrigation equipment, it proved to be economical, because the high prices paid for winter vegetables on the European market covered the investment, for which relatively cheap credit was available. Labour costs were saved, because pipes did not have to be moved and could also be used to apply fertilizers.

In the case of the Arava farmers, the problem of information flow through communication channels did not exist. As we have seen, these farmers actually took part in the creation of new knowledge and gave high priority to the implementation of the innovations. Success came and the desert community flourished.

As in any community development process, new problems came up, new needs were identified, and the cycle started again. With the expansion of the irrigated area, in the Arava valley, water became more and more rare. Varieties with less transpiration and a higher growth/water consumption rate were needed, and the use of water had to be made more efficient. These new or more felt needs were fed back into the knowledge seeking cycle. The University of the Negev and other research institutes specializing in desert biology intensified their research on halophytic cultural plants. Also on the technological front, the new needs triggered further developments. Computers which receive data on soil and climatic factors (some directly from measuring instruments in the field) now open and close valves at the right time and help to save water. This quite expensive devices proved to be economical under Arava conditions, where the alternatives were water transport over hundreds of kilometers, or a search for deeper water sources, the availability of which was most uncertain.

The bio-technical knowledge which was crucial in the development of the Arava community might not be so useful in the case of other arid zone communities, even if the ecological data match, and the same biological principles rule plant life and can be applied to plant management. Drip irrigation is a quite highly developed technology. Careful planning and handling of the system is necessary. Emitters have to be kept clean, filters have to be maintained. Furthermore, the installation of the plastic pipe system costs per hectare more than other irrigation systems. It is labour saving, but in most developing countries, and especially in peasant communities, labour is amply available, but money for investments and technical maintenance services is not. It remains doubtful if drip irrigation gives a good solution under these

conditions. A careful consideration of all stages in the "Biological Knowledge for Community Development" Cycle is necessary to come up with the optimal plan of action in each case. Only very seldom, solutions can be transferred from one place to another.

---

# CONCEPTS AND PERCEPTIONS ABOUT THE ENVIRONMENT OF PEOPLE IN AN UPLAND COMMUNITY *

## INTRODUCTION

The Upland Community. This study on concepts and perceptions about the environment was conducted in a small village called Kapatalan in the province of Laguna*. The village is situated 500 meters above the sea level. The barrio or village started as a resettlement area in 1955 with most settlers coming from Bicol, Batangas and Quezon provinces. It had 20 families in 1955; at present there are 200 families. Population in 1975 was 1,700 with age range of 18-23 comprising the majority. The total land area is 210 ha, with 80 ha (or 38%) apportioned for housing, and the rest, for agriculture.

The proximity to the forest explains why logging and swidden farming are themost popular income generating activities. The menfolk are either hired labourers in a logging company or are individual loggers who practise logging without government permit. Both the men and womenfolk engage in swidden farming. Farm produce includes coconut, coffee, banana, rice, vegetables, root crops and citrus and are sold to either middlemen or at the town market.

---

* By Dolores F. Hernandez, assisted by Norma Villanueva and Josefina Badana, who were responsible for conducting the interviews and gathering the data in the community. The paper was prepared as part of the CBE-IUBS study on "Approaches to Community Needs - A Pilot Study of the Role of Biological Knowledge", with Dr M. Atchia as Co-ordinator. IUBS/ICASE Meeting, Singapore, June 3-7, 1981.

Science Education Center, University of the Philippines.

* Laguna, Luzon, Philippines.

The Earlier Study. The village of Kapatalan is one of two villages bordering a forested region in which the Biology Workgroup of the Science Education Center has been conducting a long term project for over two years. The initial and still ongoing project was designed to produce teaching materials based on needs and resource assessment survey of the community; the materials consequently emphasize forest-ecology, conservation, economic alternatives for the village folk and the effects of man's activities on human life. The materials are therefore community based and specific, directed to the young and the old members of the village. The earlier project is of the input model type described by the project coordinator, Dr M. Atchia, in the CBE-IUBS project document dated January, 1980. Briefly, the input model includes identification of community needs, an action program and its implementation. The current study reported herein may be considered as a follow up of that larger and earlier study of the Science Education Center, University of the Philippines.

The Present Study. After over two years of exposure to a continuing R&D project which has exposed the young and the old people of Kapatalan to various ideas and knowledge relative to forest conservation and ecology, community improvement and to activities related thereto, it seemed timely to raise questions about the concepts and perceptions of the village folk about the environment, the changes that may occur or have occured in the environment, and the consequences of man's action on the environment. How do the people of this community perceive these problems? This is in brief the focus of this mini-study. It is concerned with the meanings these questions have to the people of the community.

This study was conducted by two researchers who stayed in the village for four days to secure the data. The same set of questions were posed to both the school children and adults of the community. The children, however, were asked

the questions via a questionnaire to which they responded in writing. This was accomplished during the regular class hours of the students. The adults responded to the same questionnaire in Pilipino either in writing or verbally by an interview. The latter course of action was used by the researchers whenever an adult showed signs of difficulties in writing. The adults were interviewed or answered the questionnaires in their homes.

A summary of the questions asked of the respondents is as follows:

1. What is the environment? What things do you find in the environment?

2. What does conservation of the environment mean to you? What activities conserve the environment?

3. How do you compare the productivity of the environment now and a decade ago (i.e, 1980's compared with the 1970's)? This decade and ten years hence (1980's compared with the 1990's)?

4. What are the uses of land/water/living resources in the environment?

5. The diagram shows the amount of land apportioned to the 200 families of Kapatalan; (Show pie-graph). What changes do you think there will be ten years from now? Why?

6. Will population affect this situation? How?

7. Can man do anything to change this situation?

8. What general picture of life do you expect ten years from now (in the 1990's)?

## The Respondents

The respondents were either interviewed or were asked to respond to a questionnaire, which elicited information relevant to this study. Two population groups were used: (1) in-school population from the upper grades of the elementary level (grades IV to VI) with ages from 10 to 16 years; and (2) young adults and old people of the community, whose ages varied from 19 to 65. The distribution of the respondents by age level and sex is shown in Table 1.

Table 1. The Respondents

| Age Range | Sex | | | |
|---|---|---|---|---|
| | M | F | N | % |
| 10 - 16 | 33 | 63 | 96 | 47.76 |
| 19 - 65 | 62 | 43 | 105 | 52.24 |
| Total | 95 | 106 | 201 | 100.00 |

## Concepts and perceptions about the environment

The age group 10 to 16 conceive of their environment mainly in terms of natural components, its biological aspects and its man-made aspects. The same concepts are held by the older group (age 19 to 65) except that the biological aspects of the environment (mainly living things) ranked first, followed by natural resources and man-made resources. (See Table 2). The responses reveal that the concepts of the environment held by both groups related directly to the immediate and concrete aspects of the surroundings: the biological and physical aspects. Very few mentioned the social, cultural, aesthetic dimensions of the environment. The economic aspects are not mentioned in

any significant way except as implied by certain human activities like logging, and the use of forest products. There is little evidence of the realization of a broader conception of environment which includes the social-cultural and economic dimensions and the inter-actions among all these.

Regarding conservation of the environment, the responses of both age groups were similar in that general conservation practices (regulations relating to wildlife, hunting animals, forests, forests products, watersheds, etc) had the highest number of respondents followed by agricultural practices related to conservation and thirdly by sanitation practices. (See Table 3). The categories of responses (Table 3) include health, aesthetic, and social dimensions. Although the percentages of responses in these categories are quite low, still they indicate a broader conception of the conservation of the environment. One would have expected more replies dealing with some of the well-publicized programs of the Ministry of Human Settlements which deal with eleven basic needs of man such as food, shelter, clothing, water, energy and power.

Table 2. Concepts About the Environment

Age: 10-16

| Categories of Responses | Total | | | |
|---|---|---|---|---|
| | M* | F* | N* | % |
| Biological | 42 | 96 | 138 | 18.88 |
| Natural Resources (other than plants and animals) | 114 | 168 | 282 | 38.58 |
| Man-made Resources | 77 | 138 | 215 | 29.41 |
| Social/Cultural | 18 | 30 | 48 | 6.56 |
| Aesthetics | - | 20 | 20 | 2.74 |
| Sanitation | - | - | - | - |
| Economics | 15 | 13 | 28 | 3.83 |
| Total | 266 | 465 | 731 | 100 |

* Number of responses

Age: 19-65

| Categories of Responses | M* | F* | Total N* | Total % |
|---|---|---|---|---|
| Biological | 110 | 96 | 196 | 37.76 |
| Natural Resources (other than plants and animals) | 77 | 94 | 171 | 32.95 |
| Man-made Resources | 45 | 66 | 111 | 21.39 |
| Social/Cultural | 8 | 7 | 15 | 2.89 |
| Aesthetics | 7 | 4 | 11 | 2.12 |
| Sanitation | 2 | - | 2 | .39 |
| Economics | 13 | - | 13 | 2.50 |
| Total | 262 | 257 | 519 | 100 |

* Number of responses

Table 3. Concepts About Conserving the Environment

| Categories of Responses | Age: 10-16 | | | |
|---|---|---|---|---|
| | | | Total | |
| | M* | F* | N* | % |
| General conservation practices | 6 | 61 | 127 | 49.61 |
| Agricultural practices related to conservation | 44 | 35 | 79 | 30.86 |
| Sanitation | 10 | 16 | 26 | 10.16 |
| Health | 7 | 3 | 10 | 3.90 |
| Aesthetics | 10 | 4 | 14 | 5.47 |
| Social dimensions | - | - | - | - |
| Total | 137 | 119 | 256 | 100 |

* Number of responses

Age: 19-65

| Categories of Responses | M* | F* | Total N* | % |
|---|---|---|---|---|
| General conservation practices | 40 | 55 | 95 | 38.46 |
| Agricultural practices related to conservation | 33 | 28 | 61 | 24.70 |
| Sanitation | 19 | 21 | 40 | 16.19 |
| Health | - | - | - | - |
| Aesthetics | 2 | 26 | 28 | 11.33 |
| Social dimensions | 11 | 12 | 23 | 9.31 |
| Total | 105 | 142 | 247 | 99.99 |

* Number of responses

The people of this community perceive the use of the environment for man mainly in terms of agriculture and as a source of other products useful for man (56.18% and 54.58% of the responses of the age groups 10 to 16 and 19 to 65 were respectively in this category). Table 4 shows that the other responses (plants, water, animals, land) are viewed largely as food sources or as source of products useful to man. Only the age group 19 to 65, perceived of the forest in terms of their aesthetic and recreational values and as habitats for wildlife. It is noted that most of the responses are linked with food sources. There is for example, no mention of water as an energy source, or its use in transportation. Perhaps this is because of the lack of exposure due to the distance of this community from larger towns/cities and therefore these observations will not be common experiences to the village folk.

Table 4. Perceptions About the Uses of the Environment

| Uses of the Environment | Age: 10-16 | | | |
|---|---|---|---|---|
| | | | Total | |
| | M* | F* | N* | % |
| Agricultural Crops<br>fruits, vegetables, cereals, rootcrops, raw material source, beverage, firewood | 98 | 61 | 159 | 56.18 |

Age: 10-16

| Uses of the Environment | Total | | | |
|---|---|---|---|---|
| | M* | F* | N* | % |
| Animals<br>food source, pets and leisure, recreation for educational purposes | 12 | 8 | 20 | 7.07 |
| Plants<br>other than agricultural uses e.g medical decorative, wind break, as fence, prevention of erosion, wildlife | 30 | 13 | 43 | 15.19 |
| Land<br>buildings, mining, food source, for plants and animals | 12 | 6 | 18 | 6.36 |
| Water<br>fishponds, human use for plants and animals, for cleaning | 34 | 9 | 43 | 15.19 |
| Forests<br>habitats for wildlife, preservation,beauty | - | - | - | - |
| Total | 186 | 97 | 283 | 99.91 |

* Number of responses

Age: 19-65

| Uses of the Environment | Total | | | |
|---|---|---|---|---|
| | M* | F* | N* | % |
| Agricultural Crops | 156 | 106 | 262 | 54.58 |
| fruits, vegetables, cereals, rootcrops, raw material source, beverage, firewood | | | | |
| Animals | 17 | 34 | 51 | 10.63 |
| food source, pets and leisure, recreation for educational purposes | | | | |
| Plants | - | 44 | 44 | 9.16 |
| other than agricultural uses e.g, medical, decorative, wind break, as fence, prevention of erosion, wildlife | | | | |
| Land | 6 | 43 | 49 | 10.20 |
| buildings, mining, food source, for plants and animals | | | | |
| Water | 9 | 42 | 51 | 10.63 |
| fishponds, human use, for plants and animals, for cleaning | | | | |
| Forests | 23 | - | 23 | 4.79 |
| habitats for wildlife, preservation, beauty | | | | |
| Total | 211 | 269 | 480 | 100 |

* Number of responses

Perceptions about forest reserves

Of the 10 to 16 age group thirty-six (36%) percent of the respondents indicated that the forest areas are smaller than agricultural areas, a situation which is true. Almost an equal percentage thought that the forest area is either larger than the agricultural area or that it is equal in area with the agricultural lands which means that many have a vague perception of the area reserved for forests in their community. Quite a high percentage (36%) did not respond to this question.

Table 5. Perceptions About Forests

| Perceptions of Forest Resources | Age: 10-16 | | | |
|---|---|---|---|---|
| | | | Total | |
| | M | F | N | % |
| A. Areas presently reserved for forests* | | | | |
| equal in area with agricultural | 8 | 9 | 17 | 17.71 |
| smaller than agricultural areas | 9 | 26 | 35 | 36.46 |
| larger than agricultural areas | 6 | 13 | 19 | 19.79 |
| no answer | 10 | 15 | 25 | 26.04 |
| Total no. of respondents | 33 | 63 | 96 | 100 |

* In earlier part of interviews, land area devoted to forests was lumped together with agricultural areas. In this section the respondents were called to estimate the portion of land devoted exclusively to forest sites as compared to the area used for agriculture in their community.

Age: 10-16

Perceptions of Forest Resources

| | M | F | Total N | % |
|---|---|---|---|---|
| B. Significance of forest reserves | | | | |
| it is important to have them | 21 | 47 | 68 | 70.83 |
| no answer | 12 | 16 | 28 | 29.17 |
| Total no. of respondents | 33 | 63 | 96 | 100 |
| C. Reasons why they are important | | | | |
| for housing | 6 | - | 6 | 6.67 |
| is source of water/ stores water | 3 | 3 | 6 | 6.67 |
| for future generation | 2 | - | 2 | 2.2 |
| to control/prevent floods | 8 | 11 | 19 | 21.11 |
| provides work for people | 3 | - | 3 | 3.33 |
| provides fresh air | 3 | - | 3 | 3.33 |
| is a source of food for man and animals | 3 | - | 3 | 3.33 |

Age: 10-16

| Perceptions of Forest Resources | M | F | Total N | % |
|---|---|---|---|---|
| provides habitat for birds. animals, plants | 7 | 8 | 15 | 16.67 |
| for agriculture | 2 | - | 2 | 2.22 |
| forests are beneficial | - | 7 | 7 | 7.78 |
| for growing population | - | 6 | 6 | 6.67 |
| for the landless | - | 3 | 3 | 3.33 |
| serves as wind break | - | 7 | 7 | 7.78 |
| source of lumber | - | 4 | 4 | 4.44 |
| source of minerals and white clays | - | 1 | 1 | 1.11 |
| source of income | - | - | - | - |
| aesthetics | - | 3 | 3 | 3.33 |
| regulate temperature | - | - | - | - |
| prevents landslides and erosion | - | - | - | - |
| Total no.of resoonses | 37 | 53 | 90 | 99.99 |

Age: 19-65

| Perceptions of forests Resources | M | F | Total N | % |
|---|---|---|---|---|
| A. Areas presently reserved for forests | | | | |
| equal in area with agricultural | 25 | 10 | 35 | 33.33 |
| smaller than agricultural areas | 10 | 16 | 26 | 24.76 |
| larger than agricultural areas | 18 | 10 | 28 | 26.67 |
| no answer | 9 | 7 | 16 | 15.24 |
| Total no. of respondents | 62 | 43 | 105 | 100 |
| B. Significance of forest reserves | | | | |
| it is important to have them | 52 | 40 | 92 | 87.62 |
| no answer | 10 | 3 | 13 | 12.38 |
| Total no. of respondents | 62 | 43 | 105 | 100 |
| C. Reasons why they are important | | | | |
| for housing | 5 | 5 | 10 | 6.49 |
| is source of water/ stores water | 15 | 8 | 23 | 14.94 |

Age: 19-65

| Perceptions of Forest Resources | Total | | | |
|---|---|---|---|---|
| | M | F | N | % |
| for future generation | - | - | - | - |
| to control/prevent floods | 26 | 16 | 42 | 27.27 |
| provides work for people | - | - | - | - |
| provides fresh air | 9 | - | 9 | 5.84 |
| is a source of food for man and animals | - | - | - | - |
| provides habitat for birds, animals, plants | 8 | 7 | 15 | 9.74 |
| for agriculture | - | - | - | - |
| forests are beneficial | - | - | - | - |
| for growing population | - | - | - | - |
| for the landless | - | - | - | - |
| serves as wind break | 10 | 5 | 15 | 9.74 |
| source of lumber | - | - | - | - |
| source of minerals and white clays | - | - | - | - |
| source of income | 6 | 4 | 10 | 6.49 |
| aesthetics | 3 | - | 3 | 1.95 |
| regulate temperature | 3 | - | 3 | 1.95 |
| prevents landslides and erosion | 12 | 12 | 24 | 15.58 |
| Total no. of responses | 97 | 57 | 154 | 99.99 |

Both populations believe in the importance of forest reserves (70.83% and 93.02% for the age 10 to 16 and 19 to 65 age groups respectively).

Both populations gave a variety of reasons for why they think forests are important. The major underlying reasons ranked according to frequency by the age 10 to 16 group are: 1st control/prevent floods, 2nd provides habitat for animals, birds, plants and 3rd serve as wind break, or are beneficial in many ways.

Correspondingly the adults agreed with the children on the first rank but differed in the next two ranks: 1st control floods, 2nd prevent landslides and erosion and 3rd source of water/stores water.

It is surprising that more specific economic benefits derived from forests were not cited because the community is close to logging concessions and many of the adults are themselves individual small-scale loggers.

Perceptions about changes in the productivity of the environment

The two age groups differed greatly in comparing the productivity of the environment in the 1970's and in the 1980's. The adults think that the 70's were more productive (75.24% of the responses) whereas the children believe that the 80's (42.71% of the responses) are more productive. (See table 6). Most of the children would have no basis for comparing the productivity of these two decades; this may have been the reason why a high percentage (33.33%) did not respond to this item compared to only 4.76% who did not respond in the age group, 19 to 65.

Similarlarly, the two age groups responded differently to the question about productivity in the 1980's and in the 1990's. Compared to the 1990's the older age group believe that the 1980's will be more productive. This age group seems quite definite about this difference in productivity with 61.9% of their responses indicating higher productivity in 1980's. Only 27.62% of this group indicated higher productivity in 1990's. Furthermore, only 10.40% indicated uncertainty or not being able to determine the productivity for the 90's at this stage. The largest percentage (38.54%) of responses for the age group 10 to 16 indicated that the 1990's would be more productive while 27% indicated the 1980's will be more productive. Again a large percent (34.38%) did not respond. It is possible that the children were thinking of new development/ discoveries which would explain their belief in increased productivity in the next decade whereas the older group was thinking mainly in terms of current available technology and overpopulation hence their bleaker outlook for the next decade.

Table 6. Perceptions About Changes in the Environment

| Changes in the decades of the 1970's, the 1980's and the 1990's | No. of respondents, Age 10-16 | | | |
|---|---|---|---|---|
| | | | Total | |
| | M | F | N | % |
| A. Comparing productivity in the 1970's and 1980's | | | | |
| more production in the 1970's | 3 | 20 | 23 | 23.96 |

| Changes in the decades of the 1970's, the 1980's and the 1990's | No. of respondents, Age 10-16 | | | |
|---|---|---|---|---|
| | | | Total | |
| | M | F | N | % |
| more productive in the 1980's | 30 | 11 | 41 | 42.71 |
| same productivity in the 1980's | - | - | - | - |
| no answer | - | 32 | 32 | 33.33 |
| Total | 33 | 63 | 96 | 100 |
| B. Comparing Productivity in the 1980's and 1990's | | | | |
| more productivity in 1980 | 13 | 13 | 26 | 27.08 |
| more productivity in 1990 | 9 | 28 | 37 | 38.54 |
| cannot be determined yet/uncertain | - | - | - | - |
| no answer | 11 | 22 | 33 | 34.38 |
| Total | 33 | 63 | 96 | 100 |

| Changes in the decades of the 1970's, the 1980's and the 1990's | No. of respondents, Age 10-16 | | | |
|---|---|---|---|---|
| | | | Total | |
| | M | F | N | % |
| C. Comparing land areas for agriculture and homes now and in 1990's | | | | |
| equal areas for agriculture and residences | 4 | 9 | 13 | 13.54 |
| much larger areas for residences (e.g 2/3; 4/3) | 9 | 28 | 37 | 38.54 |
| slightly larger areas for residences | - | - | - | - |
| all areas for residences | 3 | - | 3 | 3.13 |
| cannot be determined | - | - | - | - |
| no answer | 17 | 26 | 43 | 44.79 |
| Total | 33 | 63 | 96 | 100 |

| Changes in the decades of the 1970's, the 1980's and the 1990's | No. of respondents, Age 19-65 | | | |
|---|---|---|---|---|
| | Total | | | |
| | M | F | N | % |
| A. Comparing productivity in the 1970's and 1980's | | | | |
| more production in the 1970's | 48 | 31 | 79 | 75.24 |
| more productive in the 1980's | 8 | 9 | 17 | 16.19 |
| same productivity in the 1980's | 4 | - | 4 | 3.80 |
| no answer | 2 | 3 | 5 | 4.76 |
| Total | 62 | 43 | 105 | 99.99 |
| B. Comparing Producvitity in the 1980's and 1990's | | | | |
| more productivity in 1980 | 42 | 23 | 65 | 61.90 |
| more productivity in 1990 | 16 | 13 | 29 | 27.62 |
| cannot be determined yet/uncertain | 4 | 7 | 11 | 10.48 |
| no answer | - | - | - | - |
| Total | 62 | 43 | 105 | 100 |

| Changes in the decades of the 1970's, the 1980's and the 1990's | No. of respondents, Age 19-65 | | | |
|---|---|---|---|---|
| | | | Total | |
| | M | F | N | % |
| C. Comparing land areas for agriculture and homes now and in 1990's | | | | |
| equal areas for agriculture and residences | 6 | 10 | 16 | 15.24 |
| much larger areas for residences (e.g 2/3; 4/3) | 24 | 20 | 44 | 42.00 |
| slightly larger areas for residences | 4 | 4 | 8 | 17.62 |
| all areas for residences | 3 | - | 3 | 2.86 |
| cannot be determined | 1 | - | 1 | 10.95 |
| no answer | 24 | 9 | 31 | 29.52 |
| Total | 62 | 43 | 105 | 98.19 |

The timidity of the younger age group (38.54% did not respond), to make predictions in regard to the future may be due to the dependence of most children in both rural and urban areas on the adults of the family. Although they may be involved in income-generating activities at a fairly young age especially among deprived families, the tendency is still for adults of the family, especially the parents, to make decisions and judgments about the future. It may also be that since most of the age group 10 to 16 are in school, the feelings of dependence may be stronger than would otherwise be the case.

Although a fairly large percentage of the adults' responses (42.00%) indicated that a much larger area should be allocated for homes rather than to agriculture, a large percentage (29.52%) did not reply to this item. This may be due to unfamiliarity about the actual proportions of agriculture and forest lands available although a diagram was presented in the questionnaire which gave the respondents the over all proportion of land use in their community. Perhaps their lack of familiarity with graphs inhibited responses. This is the first item to which a high percentage of adults gave no responses. The next highest percentage of responses (15.24%) indicated allocation of equal amounts of land to agriculture and to homes.

Perceptions about consequences of some changes in the environment

The major consequences perceived by the respondents of both age groups dealt mainly with reduction of land area available for farming and forest, overcrowding of human habitations, and loss of productivity of farms.

Table 7. Perceptions About Consequences of Some Changes in the Environment

| Consequences perceived by respondents | Age: 10-16 | | | |
|---|---|---|---|---|
| | | | Total | |
| | M | F | N | % |
| decrease in agricultural land areas | 11 | 11 | 22 | 30.99 |
| overcrowding of human habitation | 3 | 3 | 6 | 8.45 |
| conversion of forest to farmlands/residential areas | 8 | 13 | 21 | 29.57 |
| decrease in forest areas/ denudation of forest | 4 | 11 | 15 | 21.13 |
| nonproductive farms/loss of soil fertility | 1 | 6 | 7 | 9.86 |
| starvation and chaos | - | - | - | - |
| abandonment of agricultural areas | - | - | - | - |
| Total no. of responses | 27 | 44 | 71 | 100 |

Age: 19-65

| Consequences perceived by respondents | M | F | Total N | % |
|---|---|---|---|---|
| decrease in agricultural land areas | 10 | - | 10 | 11.49 |
| overcrowding of human habitation | 12 | 8 | 20 | 22.99 |
| conversion of forest to farmlands/residential areas | 8 | 21 | 29 | 33.33 |
| decrease in forest areas/ denudation of forest | - | 13 | 13 | 14.94 |
| nonproductive farms/loss of soil fertility | 6 | 3 | 9 | 10.34 |
| starvation and chaos | 2 | - | 2 | 2.30 |
| abandonment of agricultural areas | - | 4 | 4 | 4.60 |
| Total no. of responses | 38 | 49 | 87 | 99.99 |

It will be noted that most of the perceptions are negative and quite bleak. Although in Table 8.1 the respondents indicate they believe they can control their environment, their perceptions about the consequences of environmental changes do not support this assertion. This outlook may be partly explained by the low level of technology the people in this community are exposed to, their relative isolation from developments in the rest of the world. News media, especially articles that inform on ways by which man controls his environment, in his own country and in other places of the world are often not available.

Perceptions about the future quality of life

The two age groups had quite different perceptions about the future quality of life. The age group 10 to 16 saw the following as the most serious consequences of overcrowding in the environments:

overcrowding of schools
pollution
food and housing shortage
increased food consumption

Together these four (above) make up 49% of the responses for this group.

The adults perceived as the most significant consequences of overcrowding, the following: the more difficult struggle for life (50.51%), more problems for the community e.g., drug use (13.27%), and increased need for more services (7.14%). These 3 categories gathered a total of 70.9% of all the responses to this item compared to less than 50% of the younger group's responses spread out over four categories of responses. This indicates more agreement among adults with regard to perceptions about consequences of overcrowding.

Table 8.1. Perceptions about the future quality of life

| Responses | Age: 10-16 | | | |
|---|---|---|---|---|
| | | | Total | |
| | M | F | N | % |
| A. Consequences of over-crowding/lack of space | | | | |
| food shortage/housing shortage | 6 | - | 6 | 9.68 |
| more diseases | 2 | 3 | 5 | 8.06 |
| pollution | 3 | 6 | 9 | 14.52 |
| overcrowding of schools | 8 | 3 | 11 | 17.74 |
| more difficult struggle for life | 2 | 1 | 3 | 4.84 |
| increased malnutritions/ health problems | 2 | 3 | 5 | 8.06 |
| more problems for the community (drugs, etc) | 4 | - | 4 | 6.45 |
| increased food consumption | - | 10 | 10 | 16.13 |
| increased need for more services: vehicles, schools, teachers, doctors, etc. | - | 1 | 1 | 1.61 |

Age: 10-16

| Responses | M | F | Total N | Total % |
|---|---|---|---|---|
| increased mortality | - | 1 | 1 | 1.61 |
| greater demands on farmers | - | 2 | 2 | 3.23 |
| is bearable with government help | - | 3 | 3 | 4.84 |
| may improve if there is co-operation | 2 | - | 2 | 3.23 |
| unemployment increases | - | - | - | - |
| starvation | - | - | - | - |
| increase in school dropouts | - | - | - | - |
| more opportunities for employment/livelihood | - | - | - | - |
| Total no. of responses | 27 | 33 | 62 | 100 |
| B. Man's capacity to control his environment | | | | |
| man can change the situation | 25 | 40 | 65 | 67.71 |
| no answer | 8 | 23 | 31 | 32.29 |
| Total no. of respondents | 33 | 63 | 96 | 100 |

Age: 19-65

| Responses | M | F | Total N | % |
|---|---|---|---|---|
| A. Consequences of over-crowding/lack of space | | | | |
| food shortage/hou[illegible]g shortage | 5 | - | 5 | 2.55 |
| more diseases | - | - | - | - |
| pollution | - | 3 | 3 | 1.53 |
| overcrowding of schools | - | 8 | 8 | 4.08 |
| more difficult struggle for life | 23 | 76 | 99 | 50.51 |
| increased malnutritions/ health problems | 14 | 12 | 26 | 13.27 |
| more problems for the community (drugs, etc) | 3 | - | 3 | 1.53 |
| increased food consumption | - | - | - | - |
| increased need for more services: vehicles, schools, teachers, doctors, etc | 14 | - | 14 | /.14 |

| | Age: 10-16 | | | |
|---|---|---|---|---|
| | | | | Total |
| Responses | M | F | N | % |
| increased mortality | - | - | - | - |
| greater demands on farmers | - | - | - | - |
| is bearable with government help | 0 | - | 9 | 4.59 |
| may improve if there is co-operation | - | 4 | 4 | 2.04 |
| unemployment increases | - | 3 | 3 | 1.53 |
| starvation | - | 12 | 12 | 6.12 |
| increase in school dropouts | - | 6 | 6 | 3.06 |
| more opportunities for employment/livelihood | - | 4 | 4 | 2.04 |
| Total no. of responses | 68 | 128 | 196 | 99.99 |
| B. Man's capacity to control his environment | | | | |
| man can change the situation | 48 | 30 | 78 | 76.47 |
| no answer | 14 | 13 | 24 | 23.53 |
| Total no. of respondents | 62 | 43 | 102 | 100 |

On the question relating to man's capacity to control the environment, more adults than children indicated that man can control his environment (76.47% vs. 67.71%). Also, more children (32.29%) did not reply to this question compared with adults. This may be due to the children's lack of experience in dealing with the environment.

Table 8.2. Perceptions about the future quality of life

| Responses | Age: 10-16 M | F | Total N | % |
|---|---|---|---|---|
| C. Ways of meeting some of the problems cited in Part A, Table 8.1 | | | | |
| make better decisions | 6 | - | 6 | 6.82 |
| become helpful | 7 | - | 7 | 7.95 |
| plant more crops/ practice multiple cropping | 10 | 3 | 13 | 14.77 |
| corporate with each other/ government agencies | 1 | - | 1 | 1.14 |
| care and better use of environment | 7 | 8 | 15 | 17.05 |
| respect fellowmen | 3 | - | 3 | 3.41 |
| improve facilities/ services | - | - | - | - |
| study hard/better education | - | 6 | 6 | 6.82 |

| Responses | Age: 10-16 | | Total | |
|---|---|---|---|---|
| | M | F | N | % |
| good government | - | 9 | 9 | 10.23 |
| practise family planning | - | 17 | 17 | 19.31 |
| employment in cities/locate other jobs | - | 6 | 6 | 6.82 |
| teach about forest use | - | 5 | 5 | 5.68 |
| conserve the forest/ natural resources/ not encroach in forests | - | - | - | - |
| work harder | - | - | - | - |
| increase agricultural lands | - | - | - | - |
| have able leadership | - | - | - | - |
| Total | 34 | 54 | 88 | 100 |

Age: 19-65

| Responses | M | F | Total N | % |
|---|---|---|---|---|
| C. Ways of meeting some of the problems cited in Part A, Table 8.1 | | | | |
| make better decisions | - | - | - | - |
| become helpful | - | - | - | - |
| plant more crops/ practice multiple cropping | - | 13 | 13 | 7.69 |
| corporate with each other/government agencies | 16 | 15 | 31 | 18.34 |
| care and better use of environment | - | - | - | - |
| respect fellowmen | - | - | - | - |
| improve facilities/ services | - | - | - | - |
| study hard/better education | 5 | - | 5 | 2.96 |

Age: 19-65

| Responses | Total | | | |
|---|---|---|---|---|
| | M | F | N | % |
| good government | - | - | - | - |
| practise family planning | 26 | 21 | 47 | 27.81 |
| employment in cities/ locate other jobs | - | - | - | - |
| teach about forest use | - | - | - | - |
| conserve the forest/ natural resources/not encroach in forests | 22 | 29 | 51 | 30.18 |
| work harder | 7 | - | 7 | 4.14 |
| increase agricultural lands | 7 | - | 7 | 4.14 |
| have able leadership | - | 8 | 8 | 4.73 |
| Total | 83 | 86 | 169 | 99.99 |

Except for one item (practise family planning) the two groups do not agree much on their suggestions for meeting problems of overcrowding or lack of space. The need for co-operation with each other or with government agencies is stressed more by adults than by the children. Evidently this is an indication that adults are aware of the existence of several government agencies set up to help rural folk improve the quality of life.

To summarize, the responses of the target groups of this study reveal that

1. Their concept of the environment is largely related to the biological and physical aspects. Very few responses include broader perspective, which relate to aesthetics and social dimensions of conservation of environment.

2. Only one third of the population perceive the proportion of land used as forests as it actually is (slightly over 1/3 of the area devoted to agriculture at present).

3. The majority of both age populations gave knowledgeable replies for explaining the importance of forests; however, a substantial number favour converting forest areas to agriculture and residential areas when faced with problems of overcrowding.

4. When asked to compare the productivity of their environment in the 1970's, 1980's and 1990's, the adults gave a progressively pessimistic view of productivity for each successive decade, while the young were optimistic and indicated that the 1980's is more productive than the 1970's and the decade of the 1990's would be more productive than the 1980's.

5. A majority of the people in the village believe that man can control the environment; however, their suggestions for meeting problems of overcrowding and their perceptions of the future quality of life are rather pessimistic and do not show to any great extent a belief in man's ability to overcome or to improve that environment.

Some education implications

If the administrators and leaders of the community desire to introduce environmental education into their curriculum, cues may be taken from this study as a starting point. This may be a good time to start because the Ministry of Education and Culture plans to introduce "Environmental Living" as a cluster of subjects to be taught in the upper elementary grades. Science will be part of this cluster and will no longer be taught as a separate science course. It also seems timely to introduce a broader concept of the environment so that it is viewed as comprising the biological, physical, economic and socio-cultural aspects of the environment, and the necessary inter-relationships among them. This will be more easily accomplished if the science subject is largely oriented towards the environment.

From the responses related to land use, it seems that the students in the elementary school of this village could be taught some basic principles of land use and the rationale for apportionment of land areas.

It would also be desirable to introduce some lessons which will lead to develop decision-making skills (the need to make better decisions was cited by some of the

children as a means of meeting their community problems). Apart from this, decision-making skills could be developed in relation to land use, forest conservation, and agricultural practices. The present study reveals that although there is knowledge about the significance of conservation practices, when faced with a decision-making situation (given in a test situation), many respondents opt for immediate resolution such as conversion of forests to agricultural lands.

Finally, besides the cognitive aspects, it will be desirable to develop the affective objectives related to the principle of conservation in general and conservation of forests in particular. Some of the values that need to be stressed is the sense of responsibility for the future and future generations, in connection with the natural resources. It also seems necessary to develop self-confidence in one's ability to control the environment.

---

# THE CONCEPT OF HEALTH AND ENVIRONMENT AMONG CHILDREN OF A FISHING COMMUNITY

(Dolores F. Hernandez)*

## Introduction

Third world countries have for some time been much concerned with the development of rural areas. This concern has impelled the educational systems of many developing countries to focus attention on making their educational systems more responsive to rural communities and, correspondingly, on making learning more relevant to the environment of school children. Educators have only to consider the concentration of population in developing countries — 70% or more live in rural areas — to find strong justification for such a move.

Coupled with this circumstance is the worldwide concern about the environment and its problems, such as those caused by the pressures of man's activities and population growth on the natural as well as the social and cultural environments. The faster rate at which the natural environment is degraded, the quickly changing social institutions, the many dislocations, that result, all make it necessary for man to understand his environment better, for him to develop more responsible behaviour towards nature, and for him to acquire knowledge and skills that would enable him to maintain and/or improve the quality of his environment.

---

* Dolores F. Hernandez, Director, Science Education Center, University of the Philippines.

A study such as this one being undertaken in San Salvador, a fishing village on the island of Panay*, provides the necessary data about a rural community which can be used as take off points for learning, or for initiating needed projects and activities which engender a consciousness of the environment and an understanding of its complex biological, physical, social, and cultural nature.

In brief, a study of the community provides new perceptions for improving both the process and the content of the education of not only students in school but also adults in the community. It opens the way for introducing concepts of environmental education and new topics which relate science to real life situations in the community, and for bridging the gap between learning that takes place in the classroom and the life in the community. More specifically, it gives the teachers specific information which can be used to assist students in what Sutton calls "connection-making" (Sutton and Tomley, 1979). By this is meant broadening and changing particular concepts so that school knowledge sheds light on out-of-school experiences and vice versa, the latter broadens the former.

The fishing community

San Salvador is a fishing village located 52 km north of Iloilo City (capital of the province of Iloilo on Panay island). In 1977, when the community-based project of the Science Education Centre started in this village, San Salvador had 232 families and a population of about 1,200 people. The village is isolated from the mainland by the sea; a distance of 1/2 km has to be traversed by banca (native boat which is propelled by paddling or by means of a motor) to finally reach San Salvador.

---

*Iloilo Province, Panay Island, Phlippines.

## The Respondents

The total population of children aged 9 to 14 present in San Salvador Elementary School on the day the test was administered (January 30, 1981) was used. This age range is found in Grades III to VI. So all the classes in these grade levels were used. Each class was divided into three groups, with male and female students being as equally represented in each group as possible. In processing the responses, the age group was subdivided into two: ages 9 to 11 and ages 12 to 14. Details of the respondent population are shown in Table 1.

Table 1. Respondents in Health and Environment Association Study in San Salvador by Language Group and Age Group

| Language Group | Age: 9-11 years | | | |
|---|---|---|---|---|
| | M | F | Total | % |
| A. Hiligaynon (local) | 13 | 12 | 25 | 21.3 |
| B. Pilipino (national) | 13 | 12 | 25 | 21.3 |
| C. English | 15 | 12 | 27 | 23 |
| Total | 41 | 36 | 77 | 15.8 |

| Language Group | Age: 12-14 years | | | |
|---|---|---|---|---|
| | M | F | Total | % |
| A. Hiligaynon (local) | 8 | 6 | 14 | 11.9 |
| B. Pilipino (national) | 6 | 9 | 15 | 12.8 |
| C. English | 7 | 4 | 11 | 19.4 |
| Total | 21 | 20 | 40 | 34.2 |

n = 117

The language groups and the questions asked

The language groups were: group A, Hiligaynon, the local language; group B, Pilipino, the national language; and group C, English. Each group was asked to respond to the following two questions:

1. What comes to your mind when I say the word health? Write all your answers on your paper.

2. What comes to your mind when I say the word environment? Write all your answer on your paper.

The questions were asked in the language corresponding to the group; thus, group A was asked the questions in Hiligaynon, group B in Pilipino, and group C in English. Correspondingly, the students were asked to reply only in the language assigned to their particular group. (See Appendix for the translated questions).

The question on health was asked first, and the students were allowed to 10 minutes to complete their answers. Most

students finished in less than 10 minutes. Then the papers were collected, fresh answer sheets were distributed, and the question on environment was asked following the same procedure.

The Responses

On the health association question, there were 1,114 responses (692 from the 9 to 11 age group and 422 from the 12 to 14 age group). There were 1,537 environment associations, with 1,079 from the 9 to 11 age group and 458 from the 12 to 14 age group.

The replies were grouped together according to the type of responses given by the respondents (a posteriori grouping). Then following the pattern set by an earlier study (Schaefer, 1980), the classes of responses were further placed in more inclusive categories by the researcher (a priori grouping). The major categories, samples of response types for each category, and percentages by age and language groups are summarized in Table 2 for the health associations and in Table 3 for the environment associations.

Frequencies of responses grouped into categories of associations by language groups

On the health association question, within both age groups, the category Preventive Measures, which includes personal health habits, sanitation, cleanliness, and food (nutrition), had the most associations; in fact, it had the highest percentage of responses for all language groups, with the English group having had the highest percentage in both age groups (58.46% and 48.20% for the 9 to 11 and 12 to 14 age groups, respectively).

Table 2: Frequency of Categories of Health Association by Language and Age Groups

Age: 9-11

| Categories of Health Associations and Sample Response Type | Language Groups A % | B % | C % | Total % | Rank |
|---|---|---|---|---|---|
| 1. Social/Economic Dimensions: leisure and play activities; occupational, vocational, economic activities | 4.31 | 15 | 3.46 | 7.08 | 7 |
| 2. Public Health Services: medical personnel (nurse, doctor, dentist); hospital | 6.47 | 10.5 | 21.54 | 13.29 | 2 |
| 3. Normal Biological Functions/State: Physiological functions, sensations, being energetic, fat. | 16.81 | 10.5 | 5.38 | 10.69 | 3 |
| 4. Psychological Functions/ State: emotional state or condition; mental characteristics | 8.62 | 12.5 | 3.46 | 7.8 | 5 |
| 5. Preventive Measures: personal health habits, healthy state, cleanliness, sanitation, nutrition, food. | 46.12 | 22.5 | 58.46 | 43.93 | 1 |

| | | A | B | C | Total | Rank |
|---|---|---|---|---|---|---|
| | | % | % | % | % | |
| 6. | Physical and Natural Environment: components of the environment biotic and abiotic factors | - | - | - | - | - |
| 7. | Social Qualities and Citizenship: social groups, people, personal qualities valued by society. | 10.78 | 20 | 0.38 | 9.54 | 4 |
| 8. | Physical Characteristics and Appearance: tall, strong, good grooming, mended clothes | 6.89 | 9 | 7.31 | 7.66 | 6 |
| | N | 232 | 200 | 260 | 692 | |

Age: 12-14

Language groups

| | | A | B | C | Total | Rank |
|---|---|---|---|---|---|---|
| | | % | % | % | % | |
| 1. | Social/Economic Dimensions: leisure and play activities; occupational, vocational, economic activities | 9.68 | 4.4 | 9.35 | 7.58 | 5 |
| 2. | Public Health Services: medical personnel (nurse, doctor, dentist); hospital | - | 1.26 | 5.04 | 2.13 | 8 |

| | A % | B % | C % | Total % | Rank |
|---|---|---|---|---|---|
| 3. Normal Biological Functions/State: Physiological functions, sensations, being energetic, fat. | 6.45 | 6.29 | 5.04 | 5.92 | 6 |
| 4. Phsychological Functions/ State: emotional state or condition; mental characteristics | 6.06 | 13.84 | 6.47 | 9.72 | 4 |
| 5. Preventive Measures: personal health habits, healthy state, clean-liness, sanitation, nutrition, food | 42.74 | 45.91 | 48.20 | 45.73 | 1 |
| 6. Physical and Natural Environment: components of the enviroment biotic and abiotic factors | 7.25 | 1.26 | 6.47 | 4.74 | 7 |
| 7. Social Qualitites and Citizenship: social groups, people, personal qualities valued by society. | 9.68 | 18.24 | 5.04 | 11.37 | 3 |
| 8. Physical Characteristics and Appearance: tall, strong, good grooming,mended clothes | 16.13 | 8.81 | 14.35 | 12.80 | 2 |
| N | 124 | 159 | 139 | 422 | |

Groups:

A - Local Language
B - National Language
C - English Language
No. of Responses for Age 9 - 11 = 692
No. of Responses for Age 12 - 14 = 422
Total No. of Responses = 1,114

The category with the second highest percentage of responses varied for each language group. Within the age group 9 to 11, the second category was Normal Biological Functions/State for the local language group (16.81%); Social Qualities and Citizenship for the national language group (20%); and Public Health Services for the English group (21.54%). Still within the 9 to 11 age group, the two categories with the highest percentage for the three language groups taken all together were the same as those for the English group, viz., Preventive Measures first and Public Health Services second.

Within the age group 12 to 14, the second highest percentage of responses was in the same category, Physical Characteristics and Appearance, for both the local language group (16.13%) and the English group (14.35%). In the national language group, the second highest percentage was in the category Social Qualities and Citizenship (18.24%). Again, the first and second highest categories of responses from the three language groups for the 12 to 14 age group taken together were the same as those of the English group.

Table 3. Frequencies of Environment Associations by Language and Age Groups

Age: 9-11

| Categories of Environment Associations and sample Response Types | Language Groups A % | B % | C % | Total % | Rank |
|---|---|---|---|---|---|
| 1. Economic and Socio-Cultural Dimensions: people and personal qualities; interactions, vocational, economic, leisure activities | 4.76 | 10.4 | 7.18 | 7.41 | 6 |
| 2. Health-making Environment: personal hygiene, sanitation, nutrition, human energy. | 38.94 | 28.32 | 32.18 | 25.93 | 1 |
| 3. Animals: | 11.76 | 13.29 | 13.83 | 12.97 | 3 |
| 4. Plants: | 10.64 | 12.14 | 11.17 | 11.31 | 5 |
| 5. Man-made Environment: objects, accessories, structures | 13.17 | 11.27 | 11.97 | 12.05 | 4 |
| 6. Natural Environment: components of the environment, except plants and animals; characteristics of. | 14.57 | 16.18 | 22.07 | 17.70 | 2 |

| | | A | B | C | Total | Rank |
|---|---|---|---|---|---|---|
| | | % | % | % | % | |
| 7. | Psychological Dimensions: mental, affective, sensory | 4.20 | 4.62 | 1.6 | 3.43 | 7 |
| 8. | Aesthetic Aspects: beauty | 1.96 | 3.76 | - | 1.85 | 8 |
| | N | 357 | 346 | 376 | 1079 | |
| | | Age: 12-14 | | | | |
| 1. | Economic and Socio-Cultural Dimensions: people and personal qualities; interactions, vocational, economic, leisure activities | 13.89 | 10.55 | 8.61 | 10.7 | 5 |
| 2. | Health-making Environment: personal hygiene, sanitation, nutrition, human energy. | 25.95 | 22.68 | 22.52 | 23.36 | 1 |
| 3. | Animals: | 1.85 | 11.56 | 8.61 | 8.3 | 6 |
| 4. | Plants: | 20.37 | 17.09 | 26.49 | 20.96 | 2 |
| 5. | Man-made Environment: objects, accessories, structures | 15.74 | 19.6 | 16.56 | 17.69 | 3 |
| 6. | Natural Environment: components of the environment, except plants and animals; characteristics of. | 9.26 | 9.55 | 15.89 | 11.57 | 4 |

| | A | B | C | Total | Rank |
|---|---|---|---|---|---|
| | % | % | % | % | |
| 7. Psychological Dimensions: mental, affective, sensory | 3.70 | 2.51 | - | 1.96 | 8 |
| 8. Aesthetic Aspects: beauty | 9.26 | 6.53 | 1.32 | 5.46 | 7 |
| N | 108 | 199 | 151 | 458 | |

Groups:

A - Local Language
B - National Language
C - English Language
No. of Responses for Age 9-11 = 1079
No. of Responses for Age 12-14 = 458
Total No. of Responses = 1537

---

With regard to the environment association question, a look at Table 3 reveals close agreement of the three language groups within each age group as to the highest percentages of categorized responses. Within the 9 to 11 age group, all language groups showed the hignest percentage of responses in the category Health-Making Environment and the second highest percentage of responses in the category Natural Environment. Similarly, within the 12 to 14 age group, the highest percentage of responses for all language groups was in the category Health-Making Environment, but the second highest percentage of responses fell in the category Plants.

Frequency of associations by sex

For both males and females in the 9 to 11 age group, health category that had the most responses was Preventive

Measures (42.51% for the boys and 45.25% for the girls). Next in rank for the boys was the category Public Health Services, eliciting 14.97% of the responses. The third rank for the boys' responses was Normal Biological Functions/State, with 13.77% of the responses. For the girls the second in rank was Social Qualities and Citizenship, with 12.29% of the responses, followed closely by Public Health Services, with 11.73%.

Table 4. Frequencies of Health Associations By Sex

| Categories of Health Associations | Group A (Hiligaynon) M | | F | |
|---|---|---|---|---|
| | No. | % | No. | % |
| Age: 9-11 | | | | |
| 1. Social/Economic Dimensions | 1 | .78 | 9 | 8.74 |
| 2. Public Health Services | 12 | 9.30 | 3 | 2.91 |
| 3. Normal Biological Functions/ State | 22 | 17.05 | 17 | 16.51 |
| 4. Psychological Functions/ State | 6 | 4.65 | 14 | 13.59 |
| 5. Preventive Measures | 69 | 53.49 | 38 | 36.89 |
| 6. Physical and Natural Environment | - | - | - | - |
| 7. Social Qualities and Citizenship | 8 | 6.20 | 17 | 16.51 |
| 8. Physical Characteristics and Appearance | 11 | 8.53 | 5 | 4.85 |
| TOTAL | 129 | 100 | 103 | 100 |

| Categories of Health Associations | Group A (Hiligaynon) M No. | M % | F No. | F % |
|---|---|---|---|---|
| Age: 12-14 | | | | |
| 1. Social/Economic Dimensions | 6 | 7.41 | 6 | 13.95 |
| 2. Public Health Services | - | - | - | - |
| 3. Normal Biological Functions/ State | 6 | 7.41 | 2 | 4.65 |
| 4. Psychological Functions/ State | 8 | 9.88 | 2 | 4.65 |
| 5. Preventive Measures | 35 | 43.20 | 18 | 41.86 |
| 6. Physical and Natural Environment | 9 | 11.11 | - | - |
| 7. Social Qualities and Citizenship | 8 | 9.88 | 4 | 9.30 |
| 8. Physical Characteristics and Appearance | 9 | 11.11 | 11 | 25.58 |
| TOTAL | 81 | 100 | 43 | 99.99 |

| Categories of Health Associations | Group B (Pilipino) M No. | M % | F No. | F % |
|---|---|---|---|---|
| Age: 9-11 | | | | |
| 1. Social/Economic Dimensions | 17 | 18.28 | 13 | 12.15 |
| 2. Public Health Services | 10 | 10.75 | 11 | 10.28 |
| 3. Normal Biological Functions/ State | 14 | 15.05 | 7 | 6.54 |
| 4. Psychological Functions/ State | 10 | 10.75 | 15 | 14.02 |
| 5. Preventive Measures | 18 | 19.35 | 27 | 25.23 |
| 6. Physical and Natural Environment | - | - | - | - |
| 7. Social Qualities and Citizenship | 14 | 15.05 | 26 | 24.30 |
| 8. Physical Characteristics and Appearance | 10 | 10.75 | 8 | 7.48 |
| TOTAL | 93 | 99.98 | 107 | 100 |

| Categories of Health Associations | Group B (Pilipino) M | | F | |
|---|---|---|---|---|
| Age: 12-14 | No. | % | No. | % |
| 1. Social/Economic Dimensions | 3 | 4.23 | 4 | 4.55 |
| 2. Public Health Services | 1 | 1.4 | 1 | 1.14 |
| 3. Normal Biological Functions/ State | 5 | 7.04 | 5 | 5.68 |
| 4. Psychological Functions/ State | 12 | 16.90 | 10 | 11.36 |
| 5. Preventive Measures | 34 | 47.89 | 39 | 44.32 |
| 6. Physical and Natural Environment | - | - | 2 | 2.27 |
| 7. Social Qualities and Citizenship | 13 | 18.31 | 16 | 18.18 |
| 8. Physical Characteristics and Appearance | 3 | 4.23 | 11 | 12.50 |
| TOTAL | 71 | 100 | 88 | 100 |

Group C (English)

| Categories of Health Associations | M | | F | |
|---|---|---|---|---|
| Age: 9-11 | No. | % | No. | % |
| 1. Social/Economic Dimensions | 6 | 5.36 | 3 | 2.03 |
| 2. Public Health Services | 28 | 25 | 28 | 18.92 |
| 3. Normal Biological Functions/ State | 10 | 8.93 | 4 | 2.70 |
| 4. Psychological Functions/ State | 3 | 2.68 | 6 | 4.05 |
| 5. Preventive Measures | 55 | 49.10 | 97 | 65.54 |
| 6. Physical and Natural Environment | - | - | - | - |
| 7. Social Qualities and Citizenship | - | - | 1 | .68 |
| 8. Physical Characteristics and Appearance | 10 | 8.93 | 9 | 6.08 |
| TOTAL | 112 | 100 | 148 | 100 |

| Categories of Health Associations | Group C (English) | | | |
|---|---|---|---|---|
| | M | | F | |
| Age: 12-14 | No. | % | No. | % |
| 1. Social/Economic Dimensions | 1 | 1.92 | 12 | 13.79 |
| 2. Public Health Services | 4 | 7.69 | 3 | 3.45 |
| 3. Normal Biological Functions/ State | 4 | 7.69 | 3 | 3.45 |
| 4. Psychological Functions/ State | 4 | 7.69 | 5 | 5.75 |
| 5. Preventive Measures | 25 | 48.08 | 42 | 48.28 |
| 6. Physical and Natural Environment | 5 | 9.62 | 4 | 4.59 |
| 7. Social Qualities and Citizenship | 3 | 5.77 | 4 | 4.59 |
| 8. Physical Characteristics and Appearance | 6 | 11.54 | 14 | 16.09 |
| TOTAL | 52 | 100 | 87 | 99.9 |

TOTAL

| Categories of Health Associations | M No. | M % | M Rank | F No. | F % | F Rank |
|---|---|---|---|---|---|---|
| Age: 9-11 | | | | | | |
| 1. Social/Economic Dimensions | 24 | 7.19 | 5 | 25 | 6.98 | 6 |
| 2. Public Health Services | 50 | 14.97 | 2 | 42 | 11.73 | 3 |
| 3. Normal Biological Functions/State | 46 | 13.77 | 3 | 28 | 7.82 | 5 |
| 4. Psychological Functions/State | 19 | 6.69 | 7 | 35 | 9.78 | 4 |
| 5. Preventive Measures | 142 | 42.51 | 1 | 162 | 45.25 | 1 |
| 6. Physical and Natural Environment | - | - | - | - | - | - |
| 7. Social Qualities and Citizenship | 22 | 6.59 | 6 | 44 | 12.29 | 2 |
| 8. Physical Characteristics and Appearance | 31 | 9.28 | 4 | 22 | 6.15 | 7 |
| TOTAL | 334 | 100 | | 358 | 100 | |

TOTAL

| Categories of Health Associations | M | | | F | | |
|---|---|---|---|---|---|---|
| | No. | % | Rank | No. | % | Rank |
| Age: 12-14 | | | | | | |
| 1. Social/Economic Dimensions | 10 | 4.90 | 7 | 22 | 10.09 | 4 |
| 2. Public Health Services | 5 | 2.45 | 8 | 2 | 1.83 | 8 |
| 3. Normal Biological Functions/State | 15 | 7.35 | 5 | 10 | 4.59 | 6 |
| 4. Psychological Functions/State | 24 | 11.76 | 2.5 | 17 | 7.79 | 5 |
| 5. Preventive Measures | 94 | 46.08 | 1 | 99 | 45.41 | 1 |
| 6. Physical and Natural Environment | 14 | 6.86 | 6 | 6 | 2.75 | 7 |
| 7. Social Qualities and Citizenship | 24 | 11.76 | 2.5 | 24 | 11.01 | 3 |
| 8. Physical Characteristics and Appearance | 18 | 8.82 | 4 | 36 | 16.51 | 2 |
| TOTAL | 204 | 99.98 | | 218 | 99.98 | |

Similarly, for the 12 to 14 age group, the health category that elicited the most responses for both boys and girls was Preventive Measures, with 46.08% for the boys and 45.41% for the girls. The categories that received the next highest responses from the boys were Psychological Function/State and Social Qualities and Citizenship, both with 11.76%. The girls had Physical Characteristics for their second highest category (16.51%), followed by Social Qualities and Citizenship with 11.01%.

It is interesting to note that for both age groups, across all language groups, and in both sexes one health category — Preventive Measures — stands out as the one that drew the most responses in all instances.

With respect to environment associations, boys and girls in the 9 to 11 age group had the most responses in the category Health-Making Environment (36.92% for the boys and 30.25% for the girls). See Table 5. There was also agreement on the category that elicited the second highest number of responses, Natural Environment, with 16.03% for the boys and 19.01% for the girls. The third category with most responses from the boys was Animals, with 14.35%. For the girls, the third category was Man-Made Environment, with 12.07%.

Table 5. Frequencies of Environment Association by Sex

| Categories of Environment Associations | Group A (Hiligaynon) M | | F | |
|---|---|---|---|---|
| Age: 9-11 | No. | % | No. | % |
| 1. Social/Economic Dimensions | 9 | 4.39 | 8 | 5.30 |
| 2. Health Making Environment | 89 | 43.20 | 50 | 33.11 |
| 3. Animals | 24 | 11.65 | 18 | 11.92 |
| 4. Plants | 18 | 8.74 | 20 | 13.24 |
| 5. Man-made Environment | 26 | 12.62 | 21 | 13.91 |
| 6. Natural Environment | 26 | 12.62 | 26 | 17.22 |
| 7. Psychological Dimensions | 11 | 5.34 | 4 | 2.65 |
| 8. Aesthetic Aspects | 3 | 1.46 | 4 | 2.65 |
| TOTAL | 206 | 100 | 151 | 100 |

Group A (Haligaynon)

| Categories of Environment Associations | M | | F | |
|---|---|---|---|---|
| Age: 12-14 | No. | % | No. | % |
| 1. Social/Economic Dimensions | 6 | 11.32 | 9 | 16.36 |
| 2. Health Making Environment | 11 | 20.75 | 17 | 30.91 |
| 3. Animals | 1 | 1.89 | 1 | 1.82 |
| 4. Plants | 10 | 18.87 | 12 | 21.82 |
| 5. Man-made Environment | 13 | 24.53 | 4 | 7.27 |
| 6. Natural Environment | 9 | 16.98 | 1 | 1.82 |
| 7. Psychological Dimensions | 1 | 1.89 | 3 | 5.45 |
| 8. Aesthetic Aspects | 2 | 3.77 | 8 | 14.55 |
| TOTAL | 53 | 100 | 55 | 100 |

Group B (Pilipino)

| Categories of Environment Associations | M | | F | |
|---|---|---|---|---|
| | No. | % | No. | % |
| Age: 9-11 | | | | |
| 1. Social/Economic Dimensions | 4 | 3.23 | 32 | 14.41 |
| 2. Health Making Environment | 38 | 30.64 | 60 | 27.03 |
| 3. Animals | 22 | 17.74 | 24 | 10.81 |
| 4. Plants | 17 | 13.71 | 25 | 11.26 |
| 5. Man-made Environment | 16 | 12.90 | 23 | 10.36 |
| 6. Natural Environment | 20 | 16.13 | 36 | 16.22 |
| 7. Psychological Dimensions | 4 | 3.23 | 12 | 5.41 |
| 8. Aesthetic Aspects | 3 | 2.42 | 10 | 4.50 |
| TOTAL | 124 | 100 | 222 | 100 |

Group B (Pilipino)

| Categories of Environment Associations<br>Age: 12-14 | M | | F | |
|---|---|---|---|---|
| | No. | % | No. | % |
| 1. Social/Economic Dimensions | 10 | 10.42 | 11 | 10.68 |
| 2. Health Making Environment | 27 | 28.12 | 18 | 17.48 |
| 3. Animals | 7 | 7.29 | 16 | 15.53 |
| 4. Plants | 16 | 16.67 | 18 | 17.48 |
| 5. Man-made Environment | 25 | 26.04 | 14 | 13.59 |
| 6. Natural Environment | 6 | 6.25 | 13 | 12.62 |
| 7. Psychological Dimensions | 2 | 2.08 | 3 | 2.91 |
| 8. Aesthetic Aspects | 3 | 3.13 | 10 | 9.71 |
| TOTAL | 96 | 100 | 103 | 100 |

Group C (English)

| Categories of Environment Associations | M | | F | |
|---|---|---|---|---|
| | No. | % | No. | % |
| Age: 9-11 | | | | |
| 1. Social/Economic Dimensions | 9 | 6.25 | 18 | 7.76 |
| 2. Health Making Environment | 48 | 33.33 | 73 | 31.47 |
| 3. Animals | 22 | 15.28 | 30 | 12.93 |
| 4. Plants | 18 | 12.50 | 24 | 10.34 |
| 5. Man-made Environment | 16 | 11.11 | 29 | 12.5 |
| 6. Natural Environment | 30 | 20.83 | 53 | 22.84 |
| 7. Psychological Dimensions | 1 | 0.69 | 5 | 2.16 |
| 8. Aesthetic Aspects | - | - | - | - |
| TOTAL | 144 | 99.99 | 232 | 100 |

Group C (English)

| Categories of Environment Associations | M | | F | |
|---|---|---|---|---|
| Age: 12-14 | No. | % | No. | % |
| 1. Social/Economic Dimensions | 2 | 2.82 | 11 | 13.75 |
| 2. Health Making Environment | 21 | 29.58 | 13 | 16.25 |
| 3. Animals | 7 | 9.86 | 6 | 7.5 |
| 4. Plants | 17 | 23.94 | 23 | 28.75 |
| 5. Man-made Environment | 16 | 22.53 | 9 | 11.25 |
| 6. Natural Environment | 8 | 11.27 | 16 | 20 |
| 7. Psychological Dimensions | - | - | - | - |
| 8. Aesthetic Aspects | | - | 2 | 2.5 |
| TOTAL | 71 | 100 | 80 | 100 |

TOTAL

| Categories of Environment Associations | M | | | F | | |
|---|---|---|---|---|---|---|
| Age: 9-11 | No. | % | Rank | No. | % | Rank |
| 1. Social/Economic Dimensions | 22 | 4.64 | 6 | 58 | 9.59 | 6 |
| 2. Health Making Environment | 175 | 36.92 | 1 | 183 | 30.25 | 1 |
| 3. Animals | 68 | 14.35 | 3 | 72 | 11.90 | 4 |
| 4. Plants | 53 | 11.18 | 5 | 69 | 11.40 | 5 |
| 5. Man-made Environment | 58 | 12.23 | 4 | 73 | 12.07 | 3 |
| 6. Natural Environment | 76 | 16.03 | 2 | 115 | 19.01 | 2 |
| 7. Psychological Dimensions | 16 | 3.38 | 7 | 21 | 3.47 | 7 |
| 8. Aesthetic Aspects | 6 | 1.27 | 8 | 14 | 2.31 | 8 |
| TOTAL | 474 | 100 | | 605 | 100 | |

| Categories of Environment Associations | TOTAL | | | | | |
|---|---|---|---|---|---|---|
| | M | | | F | | |
| Age: 12-14 | No. | % | Rank | No. | % | Rank |
| 1. Social/Economic Dimensions | 18 | 8.18 | 5 | 31 | 13.03 | 3 |
| 2. Health Making Environment | 59 | 26.82 | 1 | 48 | 20.17 | 2 |
| 3. Animals | 15 | 6.82 | 6 | 23 | 9.66 | 6 |
| 4. Plants | 43 | 19.55 | 3 | 53 | 22.27 | 1 |
| 5. Man-made Environment | 54 | 24.55 | 2 | 27 | 11.34 | 5 |
| 6. Natural Environment | 23 | 10.45 | 4 | 30 | 12.61 | 4 |
| 7. Psychological Dimensions | 3 | 1.36 | 8 | 6 | 2.52 | 8 |
| 8. Aesthetic Aspects | 5 | 2.27 | 7 | 20 | 8.40 | 7 |
| TOTAL | 220 | 100 | | 238 | 100 | |

There was less agreement among the 12 to 14 age group. The boys had the following categories, in decreasing percentage of responses: Health-Making Environment (26.82%), Man-Made Environment (24.55%), and Plants (19.55%). The girls had the most responses in the category Plant (22.27%), followed by Health-Making Environment (20.17%) and Social/Economic Dimensions (13.03%).

Significance of a difference between two percentages

Are the differences between the percentages noted in the foregoing tables significant? To answer this question, a simple statistical tool was used to determine the significance of a difference between two percentages of "favourable" responses. In this case "favourable" is interpreted to mean "higher" percentage of responses, or more associations given within a given category of associations.

For the language groups, comparisons of two percentages were made for the following pairs: Groups A-B, A-C, and B-C. These were compared separately for the 9 to 11 and the 12 to 14 age groups.

The comparison of two percentages of response was similarly done for the M-F groups. This was done for the total M-F groups only, but separetely for the two age groups. Thus, this statistic was employed only for the total columns in Tables 4 and 5, and not for the M-F groups within each language group.

The standard error of the difference between the two sample percentages was calculated using the formula:

$$S_{(p_1-p_2)} = \frac{p_1 q_1}{n_1} + \frac{p_2 q_2}{n_2}$$

Next $t$ was calculated using the formula:

$$t = \frac{p_1 - p_2}{s_{(p_1 - p_2)}}$$

This value of $t$ was then evaluated by referring to a table (Table XI, p.75, Smith, 1964) which gives the probability that a value of $t$ as large as or larger than the obtained value could occur on the basis of chance variations in sampling. On the basis of the evaluated t-value, the null hypothesis that there is no difference between the response percentages for the compared pair can be rejected or accepted.

The differences found significant are summarized in Tables 6 and 7 for health and environment associations, respectively.

Table 6. Significance of the Differences of Two Percentages Relating to Health and Environment Associations by Language Groups.

| | Age: 9-11 | | |
|---|---|---|---|
| | Compared Groups | | |
| Associations | A-B t-values | A-C t-values | B-C t-values |
| 1. Health | | | |
| 1. Social/Economic Dimensions | -3.74 ** | 0.75 | 6.65 ** |
| 2. Public Health Services | -1.93 | -5.90** | -4.12 ** |

Age: 9-11

Compared Groups

| Associations | A-B t-values | A-C t-values | B-C t-values |
|---|---|---|---|
| 3. Normal Biological Functions/State | 2.43* | 6.65** | 3.41** |
| 4. Psychological Functions/ State | -1.68 | 3.90** | 6.51** |
| 5. Preventive Measures | 5.36** | 5.64** | 10.4** |
| 6. Physical and Natural Environment | - | - | - |
| 7. Social Qualities and Citizenship | -3.19** | 12.55** | 12.17** |
| 8. Physical Characteristics and Appearance | -1.18 | -1.25 | 6.89 |

Age: 9-11

| Associations | Compared Groups A-B t-values | A-C t-values | B-C t-values |
|---|---|---|---|
| 11. Environment | | | |
| 1. Economic and Socio-Cultural Dimensions | -3.35 ** | -1.79 | 2.46* |
| 2. Health-making Environment | 4.81 | 2.92** | 1.55 |
| 3. Animals | -0.87 | -1.10 | -0.31 |
| 4. Plants | -0.86 | -0.65 | 0.60 |
| 5. Man-made Environment | 1.13 | 0.72 | -0.42 |
| 6. Natural Environment | -0.80 | -3.48 ** | -2.77 ** |
| 7. Psychological Dimensions | -0.38 | 3.87 ** | 4.45 ** |
| 8. Aesthetic Aspects | -1.76 | 18.71 ** | 20.36 ** |

Age: 12-14

| Associations | Compared Groups A-B t-values | A-C t-values | B-C t-values |
|---|---|---|---|
| 1. Health | | | |
| 1. Social/Economic Dimensions | 2.92** | 0.13 | -1.98* |
| 2. Public Health Services | -6.58** | -2.49* | -2.05* |
| 3. Normal Biological Functions/State | .08 | 0.73 | 0.69 |
| 4. Psychological Functions/ State | -2.11* | 0.75 | 3.09* |
| 5. Preventive Measures | -0.68 | -1.53 | -0.49 |
| 6. Physical and Natural Environment | 5.56** | 0.37 | -2.50** |
| 7. Social Qualities and Citizenship | -2.73** | 2.48* | 7.47** |
| 8. Physical Characteristics and Appearance | 3.43** | 0.13 | -1.78 |

Age: 12-14

| Associations | Compared Groups A-B t-values | A-C t-values | B-C t-values |
|---|---|---|---|
| 11. Environment | | | |
| 1. Economic and Socio-Cultural Dimensions | 1.48 | 2.15* | 0.84 |
| 2. Health-making Environment | 1.04 | 0.94 | 0.05 |
| 3. Animals | -4.26** | -2.94* | 1.29 |
| 4. Plants | 1.49 | -1.82 | -2.59** |
| 5. Man-made Environment | -1.43 | -0.29 | 0.07 |
| 6. Natural Environment | -0.15 | -2.24* | -2.11* |
| 7. Psychological Dimensions | 1.08 | 10.20** | 13.93** |
| 8. Aesthetic Aspects | 1.53 | 6.25** | 5.34** |

* Significant at 5% level
** Significant at 1% level
\- a negative sign indicates direction of the significance towards the second group of a pair.

Significance of the differences between two percentages of responses by language groups

In the 9 to 11 age group, none of the language groups stand out as having more significant differences of percentage of responses than the other groups in respect to the health associations. It is interesting, however, to note in which categories the significant differences among language groups occured.

In terms of highest percentages of responses, Preventive Measures and Public Health Services obtained between them 57% of all the responses (see Table 2). It is also noted that for both categories the responses of the English group (C) differed significantly from those of the other two groups. Some factors that may help explain these results are: Health is taught with science in the elementary grades; in school lessons health is often discussed in terms of health habits, cleanliness, sanitation, food, and nutrition. Another explanation could be the involvement of the community and the school in an ongoing project which emphasizes health, nutrition, and community sanitation. Furthermore, science and mathematics are taught in English in Philippine schools; all other subjects are taught in Pilipino. So this could explain the performance of the English group, because all of these topics (related to health) are taught with science (and therefore in English).

It is also interesting to note that for the 9 to 11 age group, next to Preventive Measures and Public Health Services, the category Normal Biological Functions/State elicited the next highest percentages (see Table 2). Again, the specific topics which may be included in these categories are those likely to be taught and discussed in science classes. (The course in science at elementary level is actually called Science and Health). The

Hiligaynon group (A), however, had more significantly different responses than the other two groups in this category (Normal Biological Functions/State).

These same categories ranked low with the 12 to 14 age group. Next to Preventive Measures, this older group gave more responses in the category Physical Characteristics and Appearance, followed by the two categories Social Qualities and Citizenship and Psychological Functions/State. For this age group the differences in three paired comparisons (A-B, A-C, and B-C) were significant in the category Social Qualities and Citizenship and in two comparisons (A-B and B-C) in the category Psychological Functions. This group ascribed desirable social/personal qualities like obedience, industry, courtesy, and goodness to the healthy individual. Their responses also indicated their belief that the healthy individual is mentally alert, happy, and friendly. Their answers seem to indicate an expanding association with a broader notion about the environment.

An overall look at Table 6 reveals that for the health associations there are fewer differences in the responses of groups A and B than between groups A and C or groups B and C for both age groups; there are even fewer differences between groups A and B for the older age group (12 to 14). The same can be said for the other two comparisons, A-C and B-C. We might say, then, that the local language group and the national language groups showed fewer differences in their responses when compared to each other. There were more differences for both age groups between the local language group and the English group and between the national language group and the English group. An ocular inspection of the answer sheets supports this observation. For both local and national language groups there were several overlaps in in terms used, i.e., Pilipino terms would be used along with local language words and vice versa. Quite a number

of local words were found in the answer sheets of the Pilipino group. Even the students's sentences (describing some associations) showed this overlap.

Significance of the differences between two percentages of responses by sex

For the 9 to 11 age group, the differences between percentages of responses made by the boys were significant in two health categories: Normal Biological Functions and Physical Characteristics and Appearance. The differences in percentages of responses of the girls were also significant in two categories: Psychological Functions and Social Qualities and Citizenship. Similarly, in the 12 to 14 age group, the boys' and the girls' percentages of responses were significantly different in two categories per group. These are seen in Table 7.

For the environment association, there is only one significant difference per sex group for ages 9 to 11; for ages 12 to 14, the male and female groups had two each, in different categories.

Table 7. Significance of the Differences of Two Percentages Relating to Health and Environment By Sex

| Categories of Associations | Age: 9-11 M-F t-values | Age: 12-14 M-F t-values |
|---|---|---|
| I. Health | | |
| 1. Social/Economic Dimensions | 0.15 | -2.04* |
| 2. Public Health Services | 1.90 | 0.71 |
| 3. Normal Biological Functions/ State | 4.04** | 1.94 |
| 4. Psychological Functions/State | -2.55* | 2.13* |
| 5. Preventive Measures | -1.12 | 0.19 |
| 6. Physical and Natural Environment | - | 3.67** |
| 7. Social Qualities and Citizenship | -3.25** | 0.34 |
| 8. Physical Characteristics and Appearance | 2.61** | -3.05 |
| II. Environment | | |
| 1. Economic and Socio-Cultural Dimensions | -4.25** | -2.23* |
| 2. Health-making Environment | 3.93** | 2.72** |
| 3. Animals | 1.75 | -1.44 |
| 4. Plants | -0.17 | -1.03 |
| 5. Man-made Environment | 0.12 | 6.76** |
| 6. Natural Environment | -1.87 | -0.94 |
| 7. Psychological Dimensions | -0.12 | -1.15 |
| 8. Aesthetic Aspects | -1.70 | -3.42** |

* Significant at the 5% level
** Significant at the 1% level
\- a negative sign indicates direction of the significance towards the second group of a pair.

Discussion

At age 9 to 11 the associations of boys with the concept of health tend to be concrete and observable, while those of girls tend to be qualitative and value-oriented. Both categories in which the girls' responses were significantly different (Psychological Functions; Social Qualities and Citizenship) deal with qualitative ascriptions that involve affective and value aspects of behaviours or characteristics. Health here is associated (by the girls) with feelings such as happiness and well-being and with personal virtues and values which society upholds like honesty, industry, courtesy, courage, obedience, and so on. This would seem to indicate that, even at this age level, the girls are moving towards a broader view of health.

It is also noted from Table 7 that the number of significant differences of percentages between these two groups is equally shared between the males and females in both age groups and for both health and environment. In brief, there are just as many categories that are significantly different (in terms of percentage of responses in the male group) as there are in the female group.

We might say that the least difference is found in the environment associations for the 9 to 11 age group. This group differed significantly only in two categories — Economic and Socio-Cultural Dimensions, in which the girls' percentage of responses was significantly higher than the boys' (9.59% for F vs. 4.64% for M), and in Health-Making Environment, where the boys had a higher percentage of responses than the girls (36.92% for M vs. 30.25% for F).

Among the associations related with environment, for both age groups, the category which had altogether the most responses was the one described as Health-Making Environment. This includes responses pertaining to

personal hygiene, sanitation, nutrition, and human energy. Again, these closely relate to the ongoing community project, which focuses on health, sanitation, and economic alternatives. This category was followed by categories which relate to the natural and man-made environment. Objects and components of the natural environment are likely topics for discussion in the elementary school science courses. It is interesting to note that for both age groups the categories Economic and Socio-Cultural Dimensions, Psychological Dimensions, and Aesthetic Aspects ranked low, i.e, they did not elicit a large number of responses in general. These are topics not likely to be discussed in the students' science classes, but which might be discussed in other classes like Social Studies, Home Economics, or Practical Arts.

The fact that a thing is common in the environment is not a guarantee that it will be associated with the environment. It is noted, for example, that few children mentioned fish; there were 20 responses relating to fish among the 9 to 11 age group, but none in the 12 to 14 age group. Since the village in which the study was conducted is a fishing community, one would expect more answers directly related to the environment, but no mention was made of things like fish nets, fish corals, or fish pens, even though these are common, visible parts of the children's environment. It could be that the students were responding primarily within the framework of the formal classroom situation.

There were also very few imaginative and abstract responses. One girl's (12 to 14 age group) response indicated that the environment is "everywhere"; another thought of it in relation to "growth". One boy defined it as "anything in the world". Another boy (9 to 11 age group) thought of numbers in relation to the environment.

Most of the replies were in terms of concrete objects and behaviours. For example, economic activities were very specifically related to those activies possible in the community, like selling fruit, catching fish, fetching water, making a fence, farming, or chopping wood.

Both age groups associated desirable personal and social qualities like industry, courtesy, generosity, kindness, trustworthiness, helpfulness, thrift, obedience and courage with good health. A few negative qualities were also mentioned, like dishonesty, irritableness and laziness; but there were very few of these (12 responses) compared with responses of a positive nature (85 responses).

In general, then, it can be stated that the majority of associations made by the students in this study relate to the school-community project that has been ongoing for over three years and which stresses health and sanitation; includes associations with topics which are likely to have been discussed in the classroom; and are stated in very concrete terms, most of which are community specific.

The performance of the English group was very evident in categories of associations, Preventive Measures and Health-Making Environment, which are science and health related and which relate to the school-community project emphasizing these areas. The language of instruction in science and mathematics being English may have influenced these results.

The other two language groups (local and national language) brought out more associations in other dimensions like the psychological, aesthetic, economic, and socio-cultural.

Implementation for teaching

What implication may be derived for teaching in the classrooms of San Salvador, the fishing village which is the site of this study? We may take cues from the work of Ramirez and Castaneda (1974) on bicognitive development; they have identified two cognitive styles which they have explained within the framework of field sensitivity and field independence. Field independent behaviours and teaching styles are more appropriate to the teaching-learning of mathematics and science, whereas field sensitive behaviours and teaching styles are more appropriate to the social sciences and experiences which can be humanized and personalized.

The two Philippine languages employed in this study, local and national, could be used in learning social studies, a fact borne out by this study. The concepts of the children which relate to social and cultural aspects are mostly given in these languages. Knowing this, the teachers could encourage and teach a broader perspective of the environment, its social, cultural, and economic dimensions, and relate these to the narrower concept of environment (physical and biological dimensions) generally perceived by students in science classes.

On the other hand, since English is used in teaching science and mathematics, teachers should be made familiar with learning and teaching styles that enhance the development of field independent behaviours, and should use the language to further ennance this learning style.

The aim of this study is to help students develop both learning styles with as much ease as is possible. Knowing how children use the three languages, and with what categories of associations they generally utilize these languages, the teacher should capitalize on this knowledge for introducing further associations, refining current associations, or using these as a base on which to build up other related concepts.

Another implication would be the need for coordination among the teaching of science, social studies, and practical arts (home economics and prevocational studies). This is necessary to develop broader perspectives of children's perceptions about the environment as well as to bring out relationships between the biological and physical aspects of health and environment and larger, more complex interactions with not only the physical, natural world but also with the social, cultural, and psychological dimensions.

A brief seminar to acquaint the teachers with the results of this study, to clarify certain points, and to brief them on the necessary cognitive styles is in order.

---

# APPENDIX

## QUESTIONS ASKED OF THE THREE LANGUAGE GROUPS

Question I. Association with Health

Croup A. Haligaynon (local language)

Ano and masiling ninyo, o kon ano ang sa inyo pang hunahuna, o kon pensar kon mag siling abi kita sang ikkayung lawas? Isulat ninyo sa papel and inyo mga sabat.

Group B. Pilipino (national language)

Ano ang nasa isip ninyo tungkol sa salitang kalusugan? Isulat ninyo ang mga sagot sa papel.

Group C. English

What comes to your mind when I say the word health? Write all your answers on your paper.

Question II. Associations with Environment

The same questions were used as above except for the underlined words, for which were substituted the following:

A. aton palibut
B. kapaligiran
C. environment

REFERENCES

APEID, "Liking Science Education to the Rural Environment - Some Experiences". Report of a Regional Mobile Field Operational Seminar, UNESCO Regional Office for Education in Asia and Oceania, Bangkok, 1980.

Ramirez, Manuel, and Castaneda, Alfredo, Cultural Democracy, Bicognitive Development, and Education. New York: Academic Press, 1974

Schaefer, Gerhard, "The Concepts of Health and Environment in Future Biology Teaching". Mimeographed Report, Kiel, West Germany, 1980.

Smith, G. Milton, A Simplified Guide to Statistics for Psychology and Education. New York: Holt, Rinehart and Winston, Inc. 1964.

Sutton, Clive and Tomley, David, "Teaching for Action Beyond School: Theoretical and Practical Problems." Paper presented at the IUBS-CBE meeting, IPN, Kiel, November 1979.

UNESCO, "Education and the Challenge of Environmental Problems" Intergovernmental Conference on Environmental Education, Tbilisi, USSR, 14-26 October, 1977.

# ASSESSMENT OF COMMUNITY NEEDS IN MAURITIUS - THE GAP BETWEEN COMMONLY BELIEVED AND ACTUALLY EXPRESSED NEEDS

Dr Michaël Atchia
Institute of Education
Mauritius

Following the lead given by Hernandez and others and inspired by the work of IUBS - CBE on biological education and community development, this field study was undertaken in Mauritius in 1980 and 1981.

The aim of the study was, starting from "commonly believed" needs and problems of selected communities, to assess these through a process of close observation and interview. Thus any gap between what is commonly believed to be the needs and problems of a community and the actually expressed needs will be revealed.

Since one of the aims of IUBS - CBE in the field of community development is to develop new approaches or models, the pattern utilised in this study differs from those of Hernandez or Bergmann.

## Background information

The island of Mauritius has often been described as a microcosm of humanity, having within an area of 720 sq. miles, people of different religio-cultural backgrounds, ranging from Hinduism and Buddhism to Islam, Christianity and pantheism - all this based on the three major racial groups, namely caucasian, negroid and mongoloid. Over and above these differences and divisions there has established itself an extremely clear, local, Mauritian culture, which in its origin, composition and nature, has been compared to that of huge Brazil. Furthermore, from sea-level to the centre of the island ( a maximum distance

of 45 km), a variety of micro-climate and ecosystems are to be found, accompanying, so to speak, the variety of human life-styles.

Situated in the South-West of the Indian Ocean, Mauritius is an independent state with 1 million inhabitants, being like Singapore one of the densely populated island states of this world. Unlike Singapore and Hong-Kong, however, Mauritius is isolated in the Indian Ocean being over 600 km away from Madagascar and over 1000 km away from continental Africa, but having in counterpart over 1 million $Km^2$ of ocean nominally under our economic control.

Selection of communities

Two small communities were selected, from different parts of the island, for the clarity of their "commonly believed" needs and problems. Each will be referred hitherto by the letter indicated below.

Community A: A Major pre-occupation is believed to be with sugarcane cultivation, with land and agriculture generally. The village of Moka, situated close to the centre of the island, close to M.D.A sugar factory and surrounded by sugarcane fields. The main occupations of people being sugarcane cultivation and production, general agriculture, shopkeeping and other village services; there are also quite a few members of the liberal professions.

Community B: Major pre-occupation is believed to be unemployment and the need to eke out a living.

Cité Attlee is a low-income housing estate in the southern suburbs of Curepipe (the second largest town of the island). The inhabitants are mainly artisans, house employees, drivers

knitting factory workers (women only) together with a fairly large proportion of unemployed (specially among the youth).

Description of the study

Phase I : "Believed" needs and problems of 10 communities were arrived at through personal experience and conversation with village development officers, youth leaders, politicians and other. In all cases only the persons opinion as to "what are the main problems of these people" was requested. Thus over-all and externally viewed opinions were obtained. Two communities (A & B) were then selected for the study.

Phase II: Two seperate groups of enquirers were constituted.

(i) A group of student-teachers were asked to visit the 2 areas concerned and establish what according to them were the major needs and problems of the communities visited. They utilised only their own observations, no interviews. None of the visitors belonged to the communities concerned. Their lists represent an EXTERNAL EVALUATION OF NEEDS.

(ii) Teams of 6 people (1 student-teacher, 2 primary school teachers, 3 voluntary social workers) belonging to each of communities A & B were asked to establish lists of needs and problems of their own communities. They interviewed people from different age groups and occupations and utilised their own personal experience to establish lists which represent an INTERNAL EVALUATION OF NEEDS.

Items on both lists (i) and (ii) were entered without any indication of importance or preference. Making allowance for different wordings carrying reasonably similar meaning, lists (i) and (ii) were compared and the results are given below:

| Community | List (i). External Evaluation. No. of entries | List (ii). Internal Evaluation. No. of entries | No. of entries. Common to lists (i) and (ii) | Total No. of different entries for the community. |
|---|---|---|---|---|
| A | 7 | 18 | 4 | 21 |
| B | 14 | 22 | 10 | 26 |

Total No of different entries for communities A & B taken seperately = 47

Total No. of different entries for communities A & B taken together = 30

These 30 different comunity needs or problems were then grouped and re-phrased where necessary to constitute the INSTRUMENT OF SURVEY of this study. It is made up of items retained from BOTH an EXTERNAL view of these communities and INTERNAL contribution by some of their members.

Phase III: The Instrument of Survey and in fact the entire operation was written in Mauritian creole, the lingua franca of Mauritius. The original is

given in Appendix X and an English translation in Appendix Y,

With the help of volunteer interviewers the Instrument of Survey was applied to a sample population in each of communities A and B. The aim of the surveys was to discover, through close observation and conversation, which were the actual felt needs and problems of people in these communities.

For each interviewee the surveyor filled in a data (evaluation) sheet indicating his or her degree of interest for items 1 to 30. The interviews were conducted in creole, and each item was explained until the person being interviewed had sufficiently grasped the meaning to indicate his/her degree of interest/concern for the need/problem. The surveyor evaluated the answer given and recorded it on the data sheet along a scale of interest/concern so labelled.

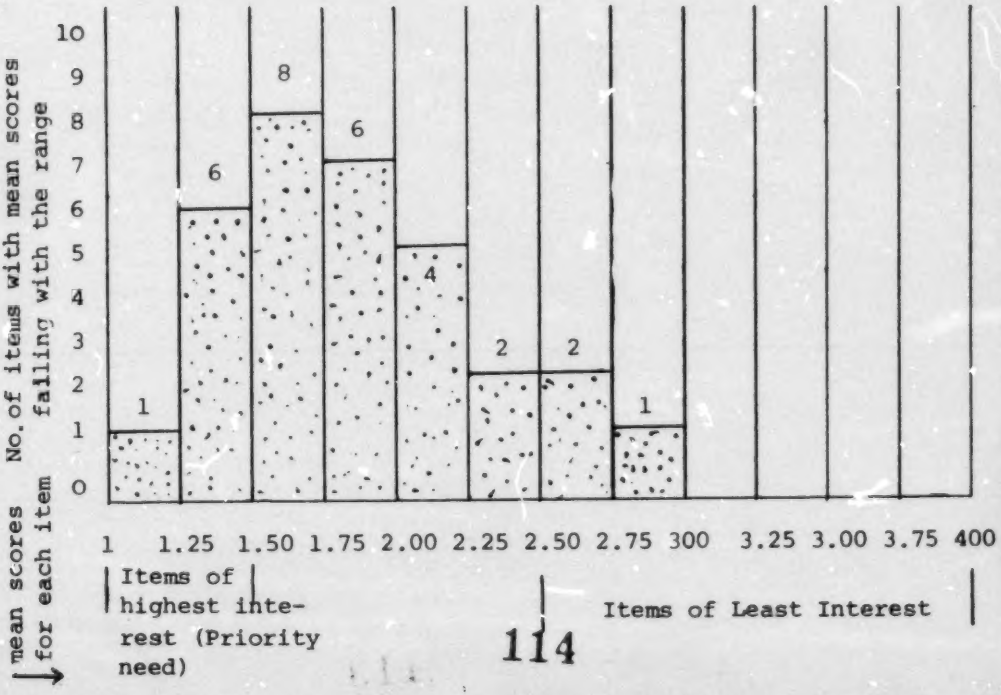
1: High degree of Interest
4: Low degree of Interest
2.5: Median

(A complete data (evaluation) sheet is given in Appendix Z). Interviews took from 10 to 15 minutes in the case of lively (literate) people to over one hour for the slower (often older) members of these communities.

## Results of the study - General considerations

The mean score for each of item 1 - 30 was calculated. Items with mean scores less than 1.5 were (arbitrarily) considered to be the priority needs of the community. Items with mean scores above 2.5 were (arbitrarily) considered to be of least interest and concern to the community.

Items with mean scores between 1.5 and 2.5 were neglected. It must be pointed out ere that although 2.5 was the median and that "lack of interest" should mathematically have been 3.5 and above the scores reflected much more interest than lack of it as illustrated by the distribution of mean scores of each of the 30 items for Community A.



Results of Study - Profile of Community A in terms of its community needs

No. of interviewers* : 2
No. interviewed : 36

The following items had mean scores of less than 1.5, indicating a high degree of concern for them.

| Item No. | Mean Store | Brief resumé of item (See Appendix X & Y for complete text) |
|---|---|---|
| 21 | 1.22 | Family planning and birth control |
| 22 | 1.31 | Means of child and mother care |
| 7 | 1.42 | Prevention of spread of disease |
| 17 | 1.45 | How to mend ... fuse, light, tap etc |
| 25 | 1.47 | How to improve the local schools |
| 14 | 1.47 | How to control pests... rats, cockroaches, flies |
| 8 | 1.47 | Access (and when to use) hospital and dispensary services |
| 3o | 1.50 | Job/employment security |

The items to which respondents from this community attached the least importance to (i.e mean score above 2.5) were

| | | |
|---|---|---|
| 11 | 2.51 | Knowing the right crop for a given soil |
| 15 | 2.55 | How to improve sugarcane yield |
| 10 | 2.76 | Posture and health |

* Thanks are due to Miss Niti Baboolall who helped to organise the survey in this village.

Either because problems of agriculture are already well known or because sufficiently covered by agricultural extension services[*1] these do not present any problem to the community.

The most strongly expressed needs are situated in the domain of health/birth control/child care/schooling together with a concern for learning how to mend things in the home.

(The "generally believed" needs of that community pre-occupation with sugarcane cultivation with land and agriculture generally) are thus entirely false. On the basis of this survey a program of biological education for this community would thus be clearly based on HEALTH with as an immediate priority the popularisation of methods of birth control.[*2]

Can it be concluded that this community is no longer on agricultural, rural community but has changed into a "modern" village whose main concern is welfare?

People of Community B, in terms of its community needs

No. of interviewers: 6[*]
No. interviewed :56 (approximately 2% of the total population of the Cité)

---

[*1] (The agricultural extension services are run by the Ministry of Agricultural and Natural Resources)

[*2] Two organisations exist on the island to deal with family planning: Mauritius Family Planning Association and Action Familiale.

[*] Thanks are due to the team of members from the "quartiers" of Curepipe who helped me to run this survey.

The following items had mean-scores of less than 1.5, indicating a high degree of concern for them.

| Item No | Mean Score | Brief resumé of content (See Appendix X and Y for complete text) |
|---|---|---|
| 29 | 1.39 | Unemployment |
| 9 | 1.39 | Exploitation of workers by employers |
| 6 | 1.43 | Curing children diseases (fever, diarrhea) |
| 7 | 1.44 | Preventing the spread of contagious disease |
| 20 | 1.45 | Choice of appropriate clothing |
| 13 | 1.46 | Continuous supply of resources (water, wood etc). |
| 27 | 1.47 | How to deal with the administration (police etc). |
| (30 | 1.50 | Job/employment security) |

The items to which respondents from this community attached the least importance to (i.e mean score above 2.5) were:

| | | |
|---|---|---|
| 16 | 2.53 | Dependance on Kerosene and wood; alternative sources of energy |
| 11 | 2.71 | Knowing the right crop for a given soil |
| 23 | 2.72 | Blood bank |
| 12 | 2.72 | Building plot and town planning |
| 10 | 3.00 | Posture and health |
| 15 | 3.59 | Sugarcane yield |

The actually expressed needs of community B compare fairly closely with the "generally believed" needs, in that unemployment and problems related to employment are in both cases in the forefront. However, with items No. 6 and 7 appearing 3rd and 4th on the list of priorities, a concern for health and disease prevention are found to be important.

Birth control and family planning methods (item No. 21) which appeared as priority 1 in community A only score 1.94 in community B; either these methods are already well known here (Action Familiale is known to be active in this Cité) or these do not pre-occupy people unduly.

Two closely related items (No. 13 relating to continuous supply of resources and No. 16 which deal with dependance an imported Kerosene and alternative sources of energy) appear respectively in the priority list and on the list of unimportant items! Does the idea of a "continuous supply" have a particular appeal? Or were the notion of alternative sources and that of dependance or imports too complex to explain in simple creole - were these notions too remote from daily concerns?

In an eventual community-development action the major inputs into B would be of a social, economic and political nature. The biological sciences could help the members of Community B in dealing with their concern for health and disease prevention -an understanding of the concept of rational use of resources could also be useful. The bio-social concept of self-sufficiency (produce your own food, lean disease prevention and home management) could perhaps be introduced with some incidence on unemployment.

With the rapidly changing "social climate" in the housing estates (Cités) of town suburbs in Mauritius, it is felt that a further survey within one or two years would be necessary, independent of whether a community educational programme is put into operation or not.

Adjustment to Instrument of Survey

At the end of the interview the following question was asked: Do you have anything to add which has not been covered by these 30 items and which you feel an urgent need for?

This question was not too successful. According to some interviewers the fact that the interview had already been long, the person wanted to be off and simply said NO to this additional question, or else the answer became very personal and the interviewee described one or more personal difficulty he/she had been having at the time.

The complete list of answers to this "adjustment" question has not been included here except for three items which occured several time as follows:

Community A: The need was felt for

"l'ecole a soir pou grand dimoune"
(Evening school for adults)

Community B: The need was felt for

Better supply of tap water to the houses.
Repair of the roads and lanes within the Cité.

Conclusion

An Instrument of Survey was developed and applied to 2 selected communities. The study of actually expressed needs is seen to be an essential step prior to starting an input into the community. The commonly believed needs of a community (specially as seen from outside or even from heresay within the community) may not at all be the actually expressed needs.

This Instrument of Survey is only valid for the communities for which it has been developed; the common list of items (30 in this case) would have probably been too large and unwieldy had it been developed from preliminary contact with more than 2 or 3 communities.

The method of study utilised could be applied elsewhere.

This study (i.e determination of needs) is considered to be the preliminary stage in an overall project of biological education and community development.

---

## APPENDIX X

List of 30 items of Instrument of Survey. (Original, in Mauritian Creole).

QUESTION:

Eski ou interessé/eski ou bizoin/eski ou cause lor sa sujet la ek famille, camarade.

ITEMS:

1. Manière ou choisir ène manzé pou ou famille, manière ou cui (manzé la ek manière ou présente li).

2. Cui légim ène façon qui ou pas pou détruire so bon vitamines.

3. Valère qui enna dans différents produits qui pou nourri ou ek valère certains légim qui nous produire tel que brède zépinards ek les zottes manzés.

4. Couma pou gagne/asté ène boute la terre pou faire ou prop la caz ou prop plantation.

5. Produire ou prop légim, pa bisin asté bazar.

6. Couma traite banne maladies ti zenfants e.g la fièvre, diarrhé.

7. Couma empésse maladies contagié [illegible]ane (tel qui la rouzole, la gratèle, lé rim).

8. Couma services la Santé (e.g l'hopital, dispensaire) capave aide ou.

9. Exploitation travayèr par employèrs. Couma

travayèr pou gagne ène pli grand proportion richesse qui travayèr zone france produire.

10. Qui manière position lé corps pou différents activité par exemple quant manzé, sizé, dormi, pou ou zouir ène bon la santé.

11. Banne plantes qui bizin planté d'après ou la terre.

12. Façon pou servi ène boute la terre c'est-à-dire qui portion ou bizin choisir pou mette ou la caze, qui coté mette ou desarze, qui coté mette drainaze, etc. couma pour arranz ene dévelopment cité, la ville etc..

13. Couma pou servi ène résource pou qui li pas fini: dilo, la terre, di bois etc..

14. Couma on capave controle banne mousse, lé rats, cancrélas etc..

15. Qui bisin faire pou cone banne pli bon méthode pou produire pli beaucoup canes.

16. Couma nou pou arrête dépane lors pétrole qui nou importé, cotte pou trouve nouveau résource l'enerzi nou capave servi pou cui.

17. Couma répare certaine kik soz dans ou la caze, couma sanz ène globe, répare ène fizib, ène robinet qui coulé, ène drain boussé.

18. Servi banne zaffaire qui nous éna dans Maurice pou faire travail, e.g vacoas pou faire tente, nattes bambous pou faire paniers, sez.

19. Problème politique; couma la politique capave aide ou viv pli bien.

20. Couma choisir linze pou différentes loccasion, pou differents saisons, pou qui nous senti nou pli confortab.

21. Family Planning ek control familiale; couma capav viv en couple sans fer zenfant.

22. Prékosion qui madame enseinte, mama ek ti baba bizoin prend pou zotte res en bonne santé.

23. Qui nou bisoin faire pou faire ça sistème transport là marche plis bien.

24. La banque di san: couma li marché ek couma ou capave servi li.

25. Couma nou capave faire pou nous l'école ek collège vine pli bon.

26. Couma ou capave prépare ou pou vive bien dans ou vié jour c'est à dire garde ène la caze pou ou, gagne ène ti pension, et faire bane zenfant okip ou.

27. Couma bizoin traite ek bane l'otorité dans pays (par example ek dimoune dans ministère, ou bien dans la police).

28. Sports, exercice pour gagne ène bon la santé.

29. Problème l'emploi.

30. Coumma pou protez ou l'emploi ène foi ou finne gagne li.

## APPENDIX Y

### Instrument of Survey

### (English Version)

QUESTION:

To what extent does each of the following correspond to one of your needs or to what extent does the subject interest you (i.e does the subject arise frequently in conversation with friends and family)?

ITEMS:

1. Family meals: choosing what to eat (methods of cooking food, ways of serving)

2. How to prepare vegetables so as not to destroy their goodness, example: their vitamins.

3. Nutritive value of various foodstuffs we eat including that of foodstuff we can produce ourselves such as greens, spinach etc.

4. How to go about acquiring a plot of land for the purpose of building one's house or cultivating crops.

5. Producing your own vegetables so as to be self sufficient and independent of vegetable sellers.

6. How to treat diseases of early childhood e.g fever, diarrhoea.

7. How to prevent the spread of contagious diseases e.g chicken-pox, scabies, influenza.

8. What sort of help can you expect to receive from Government medical services (e.g hospitals, dispensaries, mobile units etc)?

9. Industrial relations: the problem of exploitation of labour - How can workers obtain a fairer proportion of the wealth they contribute to produce?

10. Which is the best bodily posture to assume for different everyday activities such as eating, sleeping, sitting etc. in the interest of good health?

11. Choosing crops best adapted to your soil.

12. Land management (a) the appropriate way of siting a house on a plot of land with respect to drainage, garden, road etc..

    (b) the appropriate way of planning a housing-estate, a village or a town.

13. Rational use of resources in view of their conservation (and hence continued supply to us) e.g water, soil, wood.

14. The control of household pests (e.g rats, flies, cockroaches).

15. Ways and means of increasing sugarcane yield from a given plot of land.

16. How to stop being dependent on imported Kerosene and finding an alternative source of fuel/energy for cooking.

17. Learning home-handymanship so as the repare a fuse, change an electric bulb, repair a leaking tap, unblock a drain etc..

18. Learning how to work local materials for pleasure and profit e.g making bag and sleeping mats from "vacoas" leaves, baskets and chairs from bamboo. (vacoas = pandanus).

19. Politics - Can it help you to improve your quality of life?

20. Dressing correctly for (a) different occassions

    (b) different weather conditions so as to be both at ease and comfortable.

21. Family planning and birth control: how to enjoy marital/sexual relationship without conceiving.

22. Mother and child care - pre and post natal precautions needed to ensure health and well-being of mother and child.

23. Blood-bank: how it works and how it can help you.

24. Improving the public transport system in your area.

25. Improving the quality of schools and colleges in your locality.

26. What you can do (now) to ensure your well-being after retirement, i.e having a house to live in, an adequate pension and children/family to look after you.

27. How to deal with the administration e.g persons in authority at Ministries, the police etc.

28. Sports and exercise for good health.

29. The Unemployment problem.

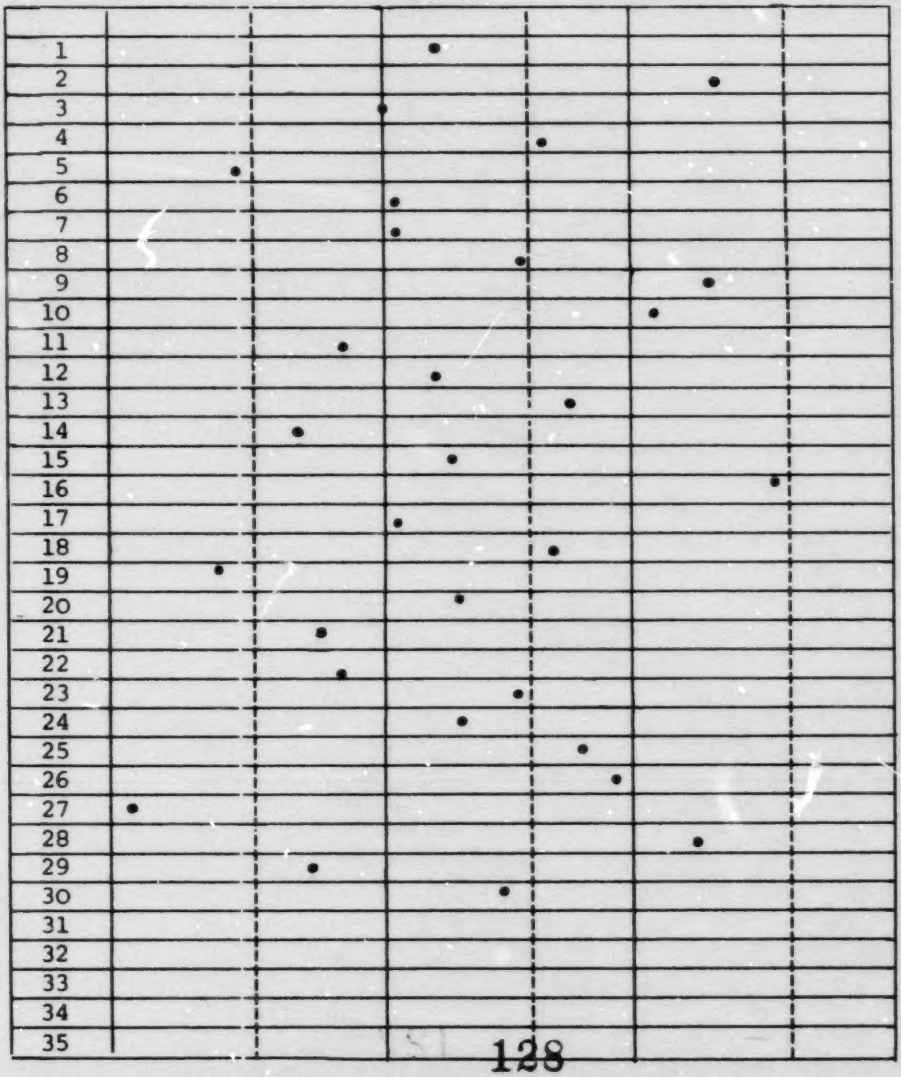
30. Job security - how to keep your job once you've got it.

ADDITIONAL QUESTION:

Are there any additional items of interest to you or any special need you have which have not been covered by the preceding 30 items?

## APPENDIX Z

### DATA (EVALUATION) SHEET



Bibliography

HERNANDEZ,D.F Biology in Community Education: a Philippine Scenario for life-long Education,in Proceedings of Asian Conference on Bio. Edu. (AABE) Kuala Lumpur 12-15 December 1978.

DELFORGE, G. Enquête sociale. La vie dans les cités C.H.A. et E.D.C. des Plaines Wilhems. IDP, Maurice,1972.

BERGMANN, H and BUDE, U. An analysis of existing school - community participation in a Central African country in King (Ed.) Education and Community in Africa, Edinburg 1976.

JUSTICE ET PAIX (ILE MAURICE) Eléments pour une réflection: La formation au travail. Diocèse de Port Louis, Ile-Maurice, 1979.

BENOIST, J. Réponses locales aux besoins essentiels dans les iles de l'Ocean Indien. Colloque Enda, Maurice, 6-12 Nov. 1978. Compte-rendu du colloque.